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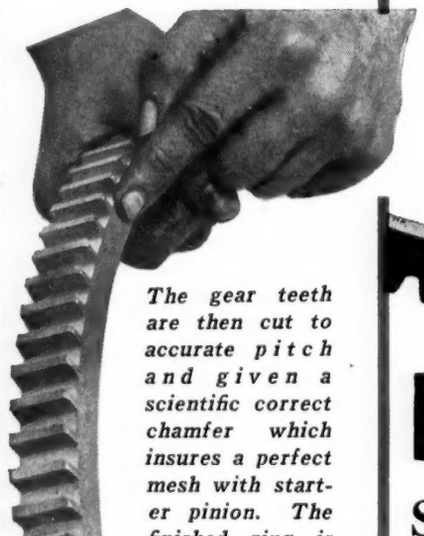

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. L NEW YORK—THURSDAY, JANUARY 24, 1924 No. 4

Work of Setting Up Balloon Tire Standards Scarcely Started

Progress has been made in recent weeks, but conference group is needed to finish important task. Situation still is confused, but opinion is crystallizing.

By Norman G. Shidle and Herbert Chase

DEFINITE progress has been made toward standardization of sizes for balloon tires. Agreement on a set of sizes by the Rubber Association and tentative approval of them by the Tire & Rim Division of the Society of Automotive Engineers Standards Comittee constitute the first specific steps toward final solution of a standards problem as important as any which has faced the automotive industry in many years. The action of these two organizations has resulted in some provisional standards for immediate use which should form an excellent basis for future development.

But the job has been only fairly started. Even men who had much to do with the establishment of the sizes agreed upon by the Rubber Association recognize the limitations of the present standards and the likelihood of changes as time goes on. Car engineers who had practically no part in the actual work of setting the tentative standards, are almost a unit in declaring that sufficient data are lacking at the present time to make it possible to formulate a final schedule.

The attitude of car engineers is illustrated in the reply made by J. G. Vincent, chief engineer, Packard Motor Car Co. When asked his views he said: "I believe the sizes arrived at by the Rubber Association in its new schedule are at least an honest effort to standardize the balloon tire siuation and the schedule represents a step in advance."

T. J. Litle, experimental engineer, Lincoln Motor Co., took a somewhat similar attitude when he said: "While not final by any means, the schedule recently adopted by the Rubber Association is no doubt an effort on the part of tire manufacturers in the right direction."

Henry M. Crane, technical assistant to the president, General Motors Co. and president of the S. A. E., has expressed similar sentiments.

Opinions voiced by engineers of other leading passenger car companies follow along very much the same lines. The feeling is general that the standards set up by the Rubber Association are a step in advance, but that the final word has not yet been said. One prominent engineer states definitely that he does not approve of the schedule, but in making the statement he seems to speak for a minority.

THIS is the situation as it exists at the present time. Progress has been made, but further action in the future will be necessary.

A real need exists for some definite, orderly method of developing and acting upon future standardization of balloon tire sizes. Those who have studied the subject carefully agree that the passenger car manufacturer has a very specific interest in any standards which may be adopted. From one point of view his interest is the major one. He has to use the tires and has to adapt his vehicle to the requirements of the new type. Steering systems, spring construction, wheel clearance and many other factors of design are involved to a greater or less extent in the use of balloon tires. The car maker and his engineers are responsible for the completed vehicle and the quality and quantity of service it gives to the owner.

It is scarcely logical to ask car manufacturers to accept any set of standards without question unless their engineers have had a very definite part in setting up the schedules. The Tire & Rim Division of the S. A. E. Standards Committee tentatively approved the schedule recently set up by tire men, but that approval did not go even so far as to make the schedule recommended practice on the part of the society.

That car manufacturers do not expect to accept blindly any set of standards is evidenced by the fact that extensive experimental work in connection with balloon tires is being carried on at practically every factory in the industry. Test data are being accumulated at a rapid rate and the effect of the new tires on design is being determined. These test results will furnish a sound basis for final standardization work.

FOLLOWING is a list of cars which carry balloon tires as standard or optional equipment on one or more models:

Standard

Chrysler	*Cole*	*Wills Ste. Claire*

Optional

Anderson	*Elgin*	*Moon*
Apperson	*Flint*	*Paige*
Auburn	*Franklin*	*Peerless*
Chandler	*H. C. S.*	*Premier*
Cleveland	*Jewett*	*Reo*
Columbia	*Jordan*	*Rickenbacker*
Davis	*Kissel*	*Rollin*
Dodge Brothers	*Lafayette*	*Stutz*
Dort	*Lexington*	*Velie*
Elcar	*Lincoln*	*Westcott*
	Marmon	

In the long run it seems likely that the needs of car design as a whole will determine the sizes and types of tire put into general use. While the tire will affect car design as a whole, it is logical to assume that car design as a whole will affect balloon tires to a greater extent. The tires must be adapted to the car rather than the car to the tires, although some modifications in the vehicle are to be expected.

Knowledge of tire manufacture and construction possessed by the tire engineer, on the other hand, is absolutely essential to any intelligent consideration of standards involving tire dimensions. The tire companies have been responsible for developing the balloon tire and their understanding of certain phases of the situation is far greater than that of the car representatives.

The view of the tire engineer will be needed in any attempt at balloon tire standardization, but the view of the car engineer will be needed just as much.

Permanent Conference Committee Needed

Logical procedure in future work along these lines seems to involve some sort of permanent conference committee having on it delegates from both the Society of Automotive Engineers, representing the car manufacturers' engineering department, from the Tire & Rim Association and from the Rubber Association of America, representing the rim, wheel and tire viewpoint.

The confused situation which exists at present as regards balloon tires in general and balloon tire standards in particular make it certain that such a conference body would have plenty of useful, constructive work with which to occupy itself during the next few years. New information is being developed every day and the last word probably will not be said for some time to come.

Although sizes of tires for 20 and 21-in. rims recommended by the Rubber Association appear to be a good starting point in a scheme of standardization, their value will have to be proved through extensive tests in general service before anything approximating a permanent standard can be achieved.

Most of those who have tried tires fitted to a wider rim base appear to be convinced that the wider base adds to the stability of the vehicle, but there are honest doubts as to whether its greater weight and consequent increased cost is worth while, since the narrower base, which the present "standard" incorporates, seems to be giving substantial satisfaction in most cases.

Side Sway with Narrow Rims

Some who argue for a narrow base contend that the tires used thereon can be permitted to flex to a greater degree without premature failure than tires used on wider bases. It is admitted, on the other hand, that side sway and "galloping" does occur when narrow bases are employed, at least on some cars. Some tire engineers who make this admission add that users are not bothered by these phenomena even when they are experienced.

Nevertheless, it is true that a lack of stability and a tendency toward galloping, which are apparent chiefly at speeds of about 50 m.p.h. or higher, have been cause for considerable concern to some builders of cars which are capable of attaining such speeds in open country work. This, indeed, is one reason why some car manufacturers in this class have as yet made no announcement that they are ready to furnish balloon tires even as optional equipment.

In short, there is a general recognition that the balloon tire has unquestioned advantages and is apt to see wide if not universal application in the not distant future, but it is recognized also that this tire possesses certain characteristics which are not advantageous and which must be minimized if not eliminated before it can be considered an unqualified success.

Much of the discussion in reference to balloon tires has centered around the question of rim width. There is said to be sharp division of opinion in this matter among tire manufacturers. Firestone is known to advocate a comparatively narrow rim and to contend that it has proved quite satisfactory in service. Other tire companies have advocated a wider rim, believing that it will give greater stability and such experimental evidence as there is in this regard seems to lean toward the wider rim on this score.

It is by no means certain, however, that width of rim base is the controlling factor in respect to stability. There may be and probably are other factors in tire construction which have a bearing on stability. Although some individuals have fairly well settled views in this regard it seems safe to say that neither the tire nor the automobile engineers are quite certain as yet what are the best dimensions for tire and rim.

Some claim that the method used in constructing the tire has much to do with the stability of the vehicle on which it is used. One British observer, S. F. Edge, states that one make of balloon tire, if inflated to the pressure recommended by the manufacturer, "is far too hard and bumpy to be desirable. If the pressure is reduced to give one comfort, there is a considerable amount of side roll set up."

According to the same observer, another make of tire on the same car, but inflated to only 18 lb. pressure, proved to be absolutely steady and less inclined to roll than the other make or even the normal cord tire ordinarily used on this car. This is attributed to the extremely wide base on which the second tire referred to is

The Broad Highway of Cooperative Effort Is the Best Road

The middle road offers the quickest and easiest way to generally satisfactory balloon tire standards

mounted. This tire is said also to have given better traction.

Apparently the characteristics of the car on which the tire is tested, especially the springs used, have a great deal to do with performance of the tires. One American maker who is equipping many of his cars with balloon tires is understood to be putting them on a 4-in. nominal size rim, although the present Rubber Association standard calls for a 4½-in. nominal size. Yet this car is reported to be more stable as well as more nearly free from "galloping," bouncing and shimmying than another make of car with similar tire equipment on the wider rim.

Unbalance Causes Shimmying

Much interest is now being manifested in tests conducted by Wills Ste. Claire, Lincoln and Studebaker engineers, among others, and participated in by tire engineers, in the course of which it has developed that a lack of balance in the shoe and tube is the cause of shimmying, at least in some cases. In this connection it may be mentioned that unbalance as a cause for wheel wabble and consequent shimmying was given some prominence in these columns slightly over a year ago, although it was not then associated with balloon tires.

It is now recognized that lack of balance does result in shimmying and at least two tire makers are known to have taken steps to put both balloon casings and tubes in balance by refinements in the manufacturing process. Shoes which are 8 oz. out of balance have been found and if the valve in the tube comes at the heavy side of the casing a further unbalance of about the same amount may occur, making a total of 1 lb.

At least one tire company is now counterbalancing the valve by placing the splice in the tube opposite the valve and making the splice long enough to give the added weight which is desired. Special care is being exercised also to make the shoes of uniform sectional thickness and thus avoid unbalance in the casing.

One tire engineer, at least, now contends that shimmying which once was attributed to too narrow a rim, is, in fact, due to lack of balance. This may be true and it may well be that some of the other factors which cause wheel wabble are making themselves felt. Those who have given the subject of wabble study will recall that inclined knuckles and decrease in friction in the steering system, both of which are found in more present-day cars than formerly, have had their effect. The greater flexibility of the balloon tire itself may also be a factor in the situation.

Advocates of a six-ply tire made in approximate balloon sizes and variously termed "semi-balloon" and "balloon type" instead of a full balloon tire, which ordinarily is supposed to have four plies, are inclined to take what they consider a more conservative step and are fitting the six-ply type in preference to the four-ply. This applies primarily to 30 x 5 and 29 x 4½-in. sizes, sometimes termed taxicab tires because of their wide use on this class of vehicle.

Such a six-ply tire is not intended for so low an inflation pressure as has been associated with the balloon tire of four-ply construction, nor can these six-ply tires be expected to give the same cushioning as the lower pressure four-ply type. If these facts are appreciated by the public, all will be well, but if they fail to appreciate the difference, as some tire makers fear, and proceed to operate the six-ply variety at pressures of about 18 or 20 lb. per square inch the life of the tires is likely to be shortened materially.

Overinflation Increases Puncture Liability

On the other hand, some persons who are supposed to speak with a full knowledge of the subject, say that if a full four-ply balloon tire is inflated above its "correct" inflation pressure, variously placed at 16 to 25 lb. per square inch, it not only loses its best cushioning qualities, but is much more likely to puncture than if run at the more desirable lower pressure.

This is just another of those complications which the coming of the balloon tire has introduced and which might have been minimized if not eliminated entirely, had there existed a definite means of cooperation between the tire companies as a group and automobile engineers and executives as a group, and a better understanding of each other's problems.

A step looking toward a standard set of inflation pressures for balloon tires was taken recently by the Tire & Rim Association, which has submitted to the Rubber Association for approval the tentative schedule of loads and inflation pressures given in the appended table. While it should be understood that this table has not yet been finally adopted it is pertinent to inquire why such high inflation pressures are recommended.

On the surface it would seem that the proposed pressures are better suited to six-ply than to four-ply tires, and it is known that some prominent tire men view the subject in this light. Since it proved possible to come to a rather unexpected agreement on the question in the Tire & Rim Association, however, those who consider the pressures too high voted in favor of recommending the table to the Rubber Association where, it is believed, the table will undergo a substantial downward revision, so far as inflation pressures are concerned.

Tentative Table of Load and Inflation Pressures for Balloon Tires

(Submitted through Tire and Rim Association to Rubber Association for Approval)

Inflation Pressure, Lb. Per Sq. In.	Nominal Sectional Diameter of Tire (In.) 4.40	5.25	6.20	7.30
	Load (Lb.)			
26.....	550	725	950	1,200
28.....	590	780	1,020	1,300
30.....	630	835	1,090	1,400
32.....	670	890	1,160	1,500
34.....	710	945	1,230	1,600
*36.....	*750	*1,000	*1,300	*1,700
38.....	799	1,055	1,370	1,800
40.....	830	1,100	1,440	1,900

*Desirable load and inflation pressure.

The foregoing table is understood to have been formulated by Goodyear engineers and to represent the policy of that company in respect to inflation pressures and loads. Some other tire manufacturers hold to the view that the pressures recommended are much too high for what is termed a "true" balloon tire, although it is agreed, as we understand it, that the pressures are about right for the six-ply type of construction which Goodyear employs in some of the balloon tires which it is manufacturing.

An engineer of another tire company, when questioned in this regard, expressed the view that Goodyear is almost alone in advocacy of the higher pressure schedule, and points out that the pressures recommended are so close to those now being used even in some ordinary cord tires that the desirable cushioning qualities of "true" balloons are quite lacking. For these reasons he does not expect to see the table approved in its present form when it is considered by the Rubber Association.

Goodyear never has been sold on the 7.30-in. size balloon tire, which is one of the five sizes for 20 and 21-in. rims approved by the Rubber Association. This concern is understood to be advocating instead a 33 x 6.60-in. size made to fit a 21-in. diameter rim having a width equal to that of the rim for a 5-in. truck pneumatic but with lower flanges. This size of tire was approved some time ago by the Rubber Association. It is intended to replace 33 x 5-in. cords and has been used experimentally on various cars in about the class of Cadillac, Peerless and Packard, but, so far as we are aware, is not being manufactured for other than experimental purposes as yet.

A Separate Problem for Each Car

Under present conditions the successful application of balloon tires seems to be a separate problem for each car. Some vehicles require a change in springs to avoid what is termed "bouncing," while others are said to require snubbers but are otherwise satisfactory without spring changes. In still other cases neither spring changes nor snubbers seem to be needed.

Of course, the matter of adequate clearance both at the side of the tire and radially must be considered. To secure this clearance and still maintain adequate width of seat and the desired turning radius it has been necessary to increase the track of some cars by lengthening the axles. Similar changes are contemplated by other makers, but there is a quite natural disinclination to make them until the question of balloon tire sizes becomes sufficiently well settled to render a second change needless.

There is a quite general belief that a successful balloon tire application will involve redesigning of the steering mechanism. This idea doubtless is well grounded, but whether it need extend beyond making a change in gear reduction, at least in most cases, is open to question. So far as we have heard balloon tires have but little effect on steering when the car is in motion at ordinary speeds. When the wheels are turned with the car stationary or in quite slow motion more turning effort is required and it is here that the greater reduction is needed.

Just how far it is feasible to go in gear reduction without impairing ability to steer the car quickly and satisfactorily under conditions of relatively rapid motion probably can be answered with certainty only on a basis of experience obtained under service conditions.

The recent visit to this country of Colin Macbeth, as already indicated in these columns, has resulted in much interest in the drop-base rim and a tire made to use with it. At least one rim maker is understood to have completed the rolls necessary to form this rim in the manner recommended by Mr. Macbeth and several tire makers have made molds for tires which are to be tried out

on this type of rim in a large way. Should these experiments prove successful it is probable that such a rim will see wide use here as well as in England, where it is reported to have been favorably received already.

Drop-Base Rim Facilitates Tire Changing

On the other hand, at least one prominent tire maker takes the position that it is unwise to make alterations in favor of the drop-base rim when the conventional straight side rim fills the bill. While this attitude is quite understandable it fails to take into consideration the user's point of view in that it does not recognize one great advantage of the drop-base type, namely, the ease with which the tire can be changed without the use of any tools.

One very large automobile manufacturer is known to be greatly interested in the whole Macbeth program and is cooperating actively with tire, rim and wheel manufacturers with a view to giving it a thorough trial on a large scale. Until these tests are consummated there will be no conclusive answer to various questions which the Macbeth proposals have raised, but the very fact that steps are being taken to test them on a large scale is sufficient indication that they merit serious consideration.

First cost, beyond doubt, will play a large part in determining whether the drop-base rim is selected finally in preference to the conventional form, providing, of course, it proves satisfactory; but it is to be hoped that its apparent advantages will not be overlooked even though it costs slightly more.

Mr. Macbeth's contention that the drop-base rim weighs no more than the two-piece variety such as is now widely used, has been questioned in some quarters. Whether it does or not will depend in part upon the thickness of stock employed. The thickness advocated by Mr. Macbeth, some say, is not sufficient for adequate strength, but this would depend, of course, upon the quality and heat treatment of the stock employed. In comparing weights, however, it should not be forgotten that, for a given tire seat diameter, the drop-base rim will fit on a smaller wheel than the standard rim, so that the rim itself might be slightly heavier and still give a lighter assembly on the wheel.

Will Demountable Rims Be Abandoned?

Some who have used drop-base rims state that it is almost as easy to replace a punctured tube as it is to remove a demountable rim with its tire or a demountable wheel with its tire and replace them with a spare, especially in view of the low inflation pressure required and the fact no tools are needed. If this proves to be the case and the drop-base rim comes into general use, it might conceivably result in time in eliminating the use of demountable rims and wheels and a return to the days when demountable rims and wheels were practically unknown. Such a contingency may appear somewhat fantastic, but it is not beyond the bounds of possibility, especially when the possible decrease in cost and weight are considered.

One point in reference to the drop-base rim which should not be overlooked is the fact that its adoption would be a step in the direction of an international rim standard—an end much to be desired by both tire and car exporters.

At the present time it is common practice for most automobile companies to furnish balloon tires as optional equipment at an extra charge averaging about $75. This figure certainly does not represent the difference in first cost of the tires themselves. It is added in some cases, at least, if the manufacturer's statement can be taken at face value, to prevent a rush to balloon equipment which cannot be met by the tire producers.

However this may be, some manufacturers of tires say that the balloon type will cost very little if any more than present standard cords, once they are in production. Prices to the car manufacturer are said to be higher in some cases, but whether this will continue or not remains to be seen.

Michelin balloon tires for present standard rims carry a retail list price of 6 to 20 per cent higher than the ordinary cord sizes which they replace.

As matters now stand, at least a considerable proportion of car manufacturers seem inclined to employ, for the time being, at any rate, the sizes of balloon tires for 20- and 21-in. rims recommended by the rubber association, but tire makers have received already requests to quote on odd sizes and one or two large car producers are reported to be insisting upon balloon tires made to fit a 22-in. rim, which undoubtedly someone will make for them if they do not recede from present demands.

Looking for a Place to Land

The rubber association recently has recommended to its members certain sizes of balloon tires for existing standards of rims of 23-in. diameter. These are understood to be an answer to the move which Michelin made in introducing a few weeks earlier similar sizes chiefly for replacement purposes. If all of the sizes for 23-in. rims are placed on the market by additional companies, it is possible that they may be selected by some car makers as original equipment in order to avoid a change in rims.

These sizes, together with those recommended for 20- and 21-in. rims, about double the total number of popular sizes of ordinary cord construction regularly made for passenger car service.

Some look with more or less apprehension upon the use of balloon tires on present standard rims, partly because the cars now in service on which they will be used are not designed for them and partly because some feel that balloon tires fitted on such narrow rims may exhibit characteristics which will not react in favor of balloon tires in general.

The Wire Wheel Corp. of America has stated its belief

that "the introduction of balloon tires on standard diameter wheels will, to a very great extent, defeat the whole purpose originally intended in the introduction of the balloon tire."

According to the same concern, the balloon tire on existing standard wheels increases steering difficulty even more than the smaller diameter balloon tires because of the greater longitudinal contact length of the larger tire with the ground. It is also stated that the use of balloon tires on existing standard wheels raises the center of gravity of the car from 1 to 2½ in. as compared to balloon tires on smaller diameter wheels and thereby increases the tendency to side sway and shimmying.

It is the contention of certain tire men that only some 30 per cent of passenger car models now in use have sufficient clearance for balloon tires on their present rim equipment, but those making these sizes say that only a small fraction of cars now in use have been found to have inadequate clearance, and, further, that balloon equipment now in use is giving complete satisfaction.

These are some of the problems which the balloon tire has brought to the tire and car engineers. Remarkable progress already has been made toward solving some of them, but a great deal of work remains to be accomplished.

The efficiency with which remaining balloon tire questions are solved and the rapidity with which a permanent, workable set of standards is obtained, depends very largely on the degree of cooperation attained between the various persons and organizations interested.

Commenting on the balloon tire standards set up by the rubber manufacturers, the annual report of the Rubber Association states:

"It was necessary for the pioneers in the balloon tire field to make numerous concessions to make standardization possible, and the result may be regarded as a particularly good example of cooperation. Further cooperation of this kind will make progress more rapid in the future than it has been in the past."

The car engineer has much to contribute to setting final standards on balloon tires, and the tire engineer should have an equal share in the task. The results of their effort, if developed through a conference committee of some kind, should bring very substantial benefits to both groups and to the factories which they represent.

Honest Value Has Increased Car Sales

PUT in a brief sentence, the answer to the question "Is a motor car a luxury?" is "It all depends." It is a comfort and, to many people —doctors, for instance—a demonstrated necessity. It may be a superfluity to one who stints such provisions as life insurance, the proper education of his children or the owning of his own home. It would be easy to show figures proving that the popular investment in motor cars is an item to be counted in billions, and no small number of billions. Indeed, the annual upkeep runs into billions. But the annual upkeep of the American people runs into many billions, if we come to that.

Clothing manufacturers have pointed out, in not altogether disinterested alarm, that the people could buy more clothes they economized on gasoline to the prohibition point. Whether homes, Sunday suits, fitted bathrooms, electric appliances and other commodities which make life tolerable are sacrificed to the purchase of automobiles is an arguable question, and the simplest answer will probably not be found in figures. We shall not strengthen the Average Man, the owner of one car in ten millions, by interfering in his choice, which is his own affair. Upon the whole, and allowing for wide divergences of taste, his purchases will tend in the direction where he gets the best value for his money, the term "value" including convenience, pleasure, health and a number of other things not to be measured by any pawnbroker's standard.

Assuming that the purchase of any article precludes the purchase of some other article less desirable, what Mr. Average Man is compelled to buy for bare subsistence does not represent all his expenditure, although it may be the greater part of it. He does not live by bread alone. But some understandable figures can be offered when it is suggested that when this citizen finds his 1913 dollar will purchase $1.11 worth of automobile as against 52 cents worth of clothing and 45 cents worth of a home, independent transportation begins to look attractive.

Does not this bring us to another useful conclusion? The automobile industry has been prosperous because, no matter whether consciously or unconsciously, it has been faithfully following an economic law. With each succeeding year manufacturers of cars have been satisfied with a smaller profit and a larger turnover. Suppose some other manufacturers, whether of Sunday clothes or pianolas, tried out that way before they complained about motor car competition? The output of automobiles is eight times as large as in 1913, but the expenditure is only five and a half times as great. The clothing dollar will buy only one suit where it formerly bought two.

To maintain the 1913 output of clothing the expenditure must be doubled; on the 1913 expenditure the motor car output can be increased. Surely the car industry illustrates that prosperity rests in making goods abundant and cheap. There are too many of our manufacturers talking of Mr. Foro as a menace. Are they not likely to do better where they regard him not merely as a lesson but an encouragement?—*Wall Street Journal.*

Huge Overproduction Is Chief Feature of 1923 Petroleum Business

Eight flush pools, reaching individual peaks exceeding 100,000 barrels per day, brought in during year. Progress in drilling methods.

By Joseph E. Pogue*
Consulting Engineer

FROM the viewpoint of the automotive industry, the outstanding developments in the field of petroleum during 1923 include the following:

1. The overproduction and rapid accumulation of stocks of gasoline during the early months of the year.
2. The spectacular increase in flush crude oil production from the deep sands of the Los Angeles Basin in California.
3. The meteoric career of the Powell Field in Texas.
4. The drastic recession in crude oil and gasoline prices.
5. The rapid decline in production and the reversal of price trends in the closing weeks of the year.

The year just closed was marked by a phenomenal increase in the output of crude petroleum in the United States, resulting in a condition of serious overproduction which developed in the spring, reached an aggravated state in the summer, and persisted until the closing weeks of the year. The range and degree of this condition of oversupply is pictured graphically in Fig. 1, which shows by weeks the daily rate of gross domestic production and imports for the entire year of 1923. The scale to the left

*The statistics presented in this review were derived from the following sources: Data on crude petroleum from U. S. Geological Survey and American Petroleum Institute; refined products from U. S. Bureau of Mines; well data from *Oil and Gas Journal;* export figures from U. S. Bureau of Foreign and Domestic Commerce; prices calculated by the writer from quotations given in the *National Petroleum News,* and the *Oil, Paint and Drug Reporter.*

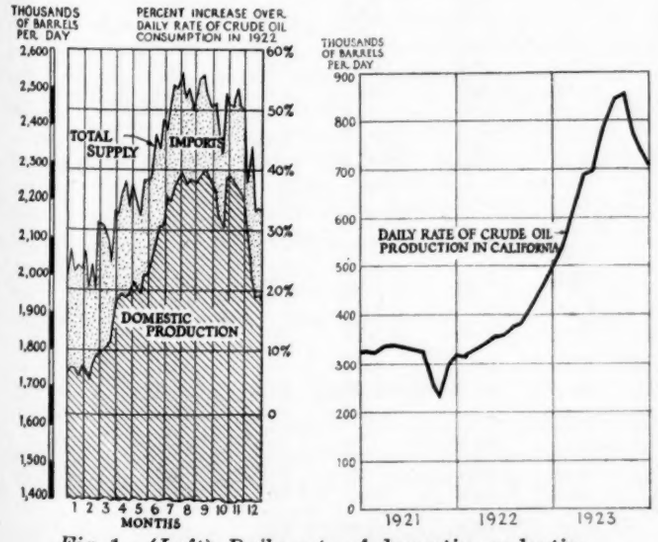

Fig. 1—(Left) Daily rate of domestic production and imports of crude petroleum by weeks in 1923, showing also the rate of increase over the average daily consumption of crude petroleum in 1922

Fig. 2—(Right) Daily rate of crude oil production in California, 1921-1923

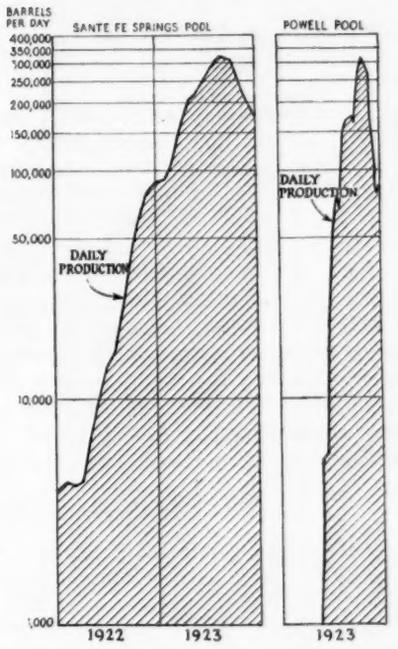

Fig. 3—Rate of increase, date of peak, and rate of decline in the daily production of the Sante Fe Springs and Powell oil pools

of the chart gives the daily rate of supply in barrels, while the scale to the right shows the rate of supply in percentages of the rate of consumption in 1922. It may be seen that during the summer the rate of crude oil supply exceeded the average daily demand of the previous year by more than 50 per cent, which obviously indicates a state of serious overproduction, since demand did not (and could not) register such an acute increase. Attention should be called, also, to the decline in supply recorded over the fourth quarter of the year, and particularly during December.

The primary cause of the increase in domestic crude oil production from under 1,800,000 barrels per day in the winter of 1923 to 2,300,000 barrels per day by late summer, was the development of three phenomenal deep-sand pools in the Los Angeles Basin in California. The importance of this factor is indicated in Fig. 2, in which the daily rate of crude oil production in California is shown from the beginning of 1921 to the end of 1923. It may be seen from an inspection of this chart that California production increased from 500,000 barrels per day at the beginning of 1923 to about 855,000 barrels per day in September, after which it declined fairly rapidly to about 710,000 barrels per day by the close of December. It should be observed, too, that the increase in the rate of California's output did not begin with 1923, but had

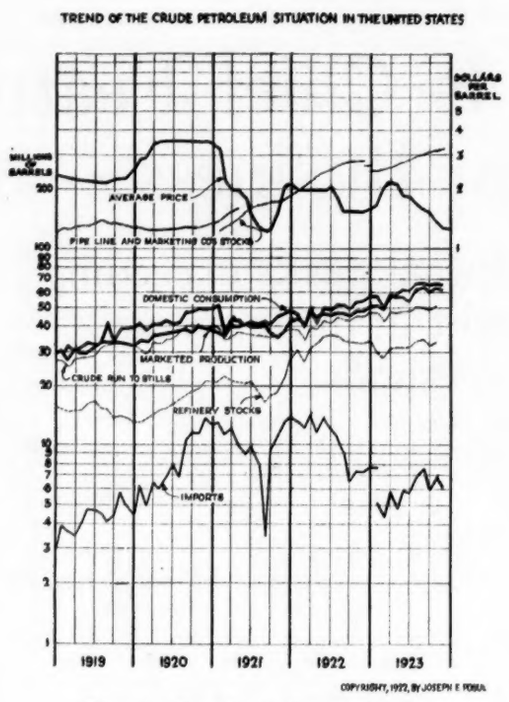

Fig. 4—Trend of the crude petroleum situation in the United States by months, 1919-1923

its inception in early 1922; 1923 was entered with a sharp upward trend already established.

This remarkable increase of production in California, which led to a collapse of the crude oil and gasoline markets of the entire country, was caused by the opening up of deep sands of unusual thickness and richness in three pools within a few miles of Los Angeles—at Santa Fe Springs, Long Beach, and Huntington Beach.

Large Pools Brought In

These pools combined reached a maximum of 650,000 barrels per day in September, 28 per cent of the entire output of the United States in that month. Their speed of development and consequently the rate at which their oil content was extracted were accentuated by their location in town-lot sections within easy reach of Los Angeles; the properties were over-drilled, in spite of depths of 4000 and 5000 feet to which the drill had to penetrate; a great flood of oil was thrown on the market; the fairly high gasoline content of this oil, averaging perhaps 25 per cent, unprecedented for California, made the oil attractive to world markets; and the presence of the Panama Canal and a large, idle tanker fleet, coupled with the low price commanded by this oil at the well, speeded up its movement to the eastern seaboard and Europe. We even witnessed the phenomenon of California oil being refined in Mexico, and the products therefrom being shipped to the United States and Europe.

At the very time California oil was growing so rapidly in output, four flush fields east of California were approaching their crests—Smackover in Arkansas, Tonkawa and Burbank in Oklahoma, and Salt Creek in Wyoming added their quota of oil to the rising flood. And, finally, to cap the climax, just at the time when California production was passing its crest and the output of Oklahoma was beginning to subside, a gusher field at Powell in Texas flashed upon the scene and in a few months was contributing over 300,000 barrels per day on its own account.

Thus 1923 saw 8 flush pools reaching individual peaks exceeding 100,000 barrels per day, when in the whole previous history of the American petroleum industry there had been only 11 pools of the 100,000 barrel class! And of these 8 pools that bunched in 1923, 2 of them—the Santa Fe Springs and Powell pools—exceeded 300,000 barrels per day! The rate at which these latter two super-pools came upon the scene is depicted in Fig. 3.

Just as the bunching of 8 major oil-pools in 1923 made this a year of overproduction, so the decline of these pools, and particularly of the two largest—Sante Fe Springs and Powell—wiped out most of the oversupply in the closing weeks of the year and brought a reversal in the trend of oil markets.

Domestic Production Increases

The trend of the crude petroleum situation by years from 1913 to 1923 and by months during 1923 is shown in Table 1. It may there be seen that in 1923 as compared with 1922, domestic production increased 165 million barrels, or 29.5 per cent; imports declined 53 million barrels, or 42 per cent; stocks increased 60 million barrels, or 22.7 per cent; and domestic consumption expanded 108 million barrels, or 18.1 per cent.

The trend of the crude oil situation by months over the period, 1919-1923, is shown graphically in Fig. 4. It may be seen from the curve of crude oil stocks in Fig. 4 that there has been an almost unbroken period of overproduction in the United States from late 1920 to the end of 1923.

Crude oil production in this country between 1907 and 1919 has increased at the average rate of 7.1 per cent per year; from 1919 to 1923 the rate of increase has more than doubled, averaging over the latter period 16.6 per cent per year. This increase in the momentum of crude oil production may be ascribed to improved technique in

Table 1.—Trend of the Crude Pretroleum Situation

(In millions of barrels)

By Years	Domestic Production	Imports	Stocks End of Period	Domestic Consumption	Average Price, $ per Bbl.
1913...	248	17.8	123	262	$1.14
1914...	266	17.2	142	261	.93
1915...	281	18.1	164	273	.75
1916...	301	20.6	162	319	1.33
1917...	335	30.2	146	378	1.77
1918...	356	37.7	122	413	2.22
1919...	378	52.8	128	418	2.25
1920...	443	106.2	134	530	3.44
1921...	472	125.3	184	526	1.86
1922...	558	127.3	265	592	1.78
1923...	723[a]	74.0[a]	325[a]	700[a]	1.71
By Months 1923					
Jan.	...51.5	6.23	253	56.2	1.69
Feb.	...48.4	4.37	255	49.7	2.04
Mar.	...56.1	5.84	259	57.6	2.13
Apr.	...58.1	4.97	265	55.7	2.11
May	...62.0	5.95	273	58.0	1.86
June	...61.5	6.00	284	54.4	1.82
July	...65.3	6.90	293	61.2	1.70
Aug.	..65.7	7.58	299	62.4	1.60
Sept.	..64.4	6.02	307	60.4	1.54
Oct.	...66.0	6.90	315	63.4	1.40
Nov.	...64.5	6.09	323	61.2	1.29
Dec.	.....	...	...	...	1.28

[a]December, estimated.

oil-finding and oil-exploitation, to wider use of geology, deeper drilling, and so on. This improved technique, in turn, has been stimulated by the large flow of capital into the petroleum industry, particularly in 1919 and 1920, in the belief that an impending oil shortage would lead to high prices and exceptional profits.[1] That the increase in domestic production over the past few years has not been due to any substantial increase in the volume of drilling but has resulted from larger yields per well drilled, is shown for the territory east of California in Table 2.

Mexican Output Declines

As shown in Table 1 and Fig. 4, imports of crude oil into the United States declined sharply in 1923 as compared with 1922, although the rate of imports during 1923 held fairly level. In Mexico, the light-oil production declined from about 260,000 barrels per day at the beginning of 1923 to around 150,000 barrels per day at the close of the year. Heavy-oil production in Mexico, on the contrary, increased from 170,000 barrels per day at the outset of the year to about 270,000 barrels per day at the end of the year. This change in the character of Mexican production was reflected in the quality of the imports of crude oil into this country, the light-oil imports during the course of the year having dropped from 72,000 barrels per day to about 45,000 barrels per day, while the heavy oil imports have grown from 90,000 barrels per day to around 170,000 barrels per day.

Table 2.—Number and Size of New Oil Wells Completed in the United States by Years 1913-1923

	No. of Oil Wells Completed	Total Initial Production, Thousand Bbls.	Average Initial Production per well, Bbls.
1913	18,824	781	42
1914	16,140	1,471	91
1915	8,892	1,715	193
1916	18,080	1,497	83
1917	15,673	1,383	88
1918	16,698	1,486	88
1919	20,686	3,366	163
1920	23,738	3,339	141
1921	13,943	2,640	189
1922	16,201	3,912	241
1923	15,327	4,602	300

In late 1923 what appears to be a new light-oil field was brought in a short distance south of the now depleted Alamo Pool, at the southern end of the chain of prolific oil pools that were so prominent in 1920-1922 and so often referred to as the "Golden Lane." While it is too early to appraise the significance of this new discovery, it offers the prospect of offsetting in 1924 the declines of the older light-oil pools of Mexico, if not causing some increase in overall output.

Stocks Accumulate

The outstanding feature of the gasoline situation during 1923, aside from the drastic decline in prices that took place, was the excessive accumulation of gasoline stocks during the winter. This development is shown graphically in Fig. 5, where it may be observed from a comparison of the curve of stocks in early 1923.

[1] This subject is discussed by the writer in a paper entitled "The effect of improved technique upon the production of petroleum in the United States," presented before American Statistical Association on December 28, 1923.

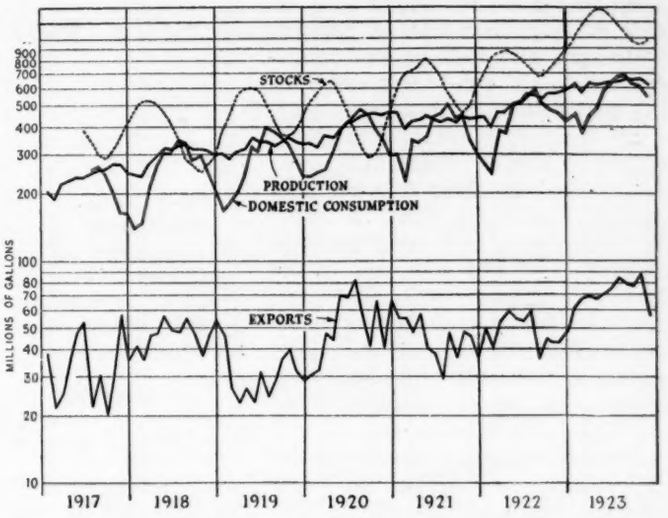

Fig. 5—Trend of the gasoline situation in the United States by months, 1917-1923. This chart covers the entire period for which detailed gasoline statistics are available

During the winter of 1922-23, the refiners of the country, in anticipation of a large increase in demand, speeded up their refinery activities, installed large numbers of stills for cracking fuel oil into gasoline, and built up top-heavy gasoline inventories. Then, the low priced light-oil from California came upon the Eastern market in large volume, undermining the price structure of the entire country. The combination of excessive gasoline inventories with a heavy overproduction of cheap crude oil gave the country lower gasoline prices than have been witnessed in years. In the face of a 25 per cent increase in the consumption of gasoline, the supplies of this commodity were more than ample and many gasoline manufacturers were driven into bankruptcy.

Adequate Supplies on Hand

The monthly rate of change in gasoline stocks in the United States is shown over the past five years in Fig. 6. The ruled areas show the volume of gasoline added to storage each season, while the stippled areas indicate the volume of withdrawals from storage. It may be seen that the additions to storage have exceeded the withdrawals from the storage for the past three years, and in consequence the supply of gasoline has at all times been easy, and especially so in 1923.

The proportion of gasoline extracted from crude oil has

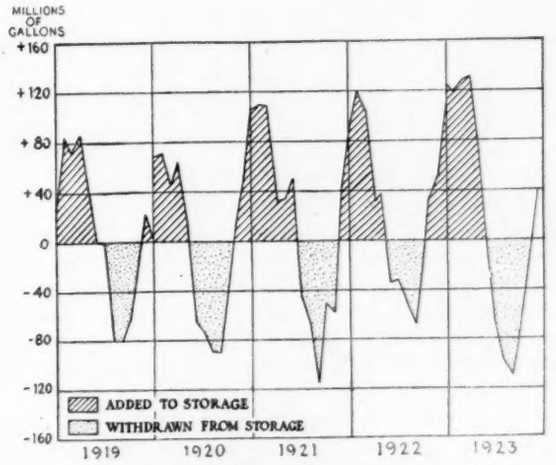

Fig. 6—Monthly rate of change in gasoline stocks in the United States, 1919-1923

been increased for years as a result of improvements in refining technique, and 1923 proved no exception to the rule. For example, the percentage of gasoline recovered from the total volume of crude oil run to stills has been: 26 per cent in 1918; 26.0 per cent in 1919; 27.4 per cent in 1920; 27.7 per cent in 1921; 29.2 per cent in 1922; and 31.3 per cent in the first 10 months of 1923. The market increase in the recovery factor in 1923 as compared with 1922 was one of the elements that contributed to the overproduction of gasoline.

Table 3.—End-Point of Motor Gasoline in Selected Cities in Recent Years

Data from U. S. Bureau of Mines
(In degrees Fahrenheit)

	1919,	1920		1921		1922		1923	
	April	Jan.	July	Jan.	July	Jan.	July	Jan.	July
New York	411	418	432	417	422	421	420	420	422
Washington	426	439	449	439	442	428	426	424	434
Pittsburgh	425	425	454	430	435	430	429	423	435
Chicago	423	445	455	439	444	442	436	433	444
New Orleans	435	424	445	428	427	428	427	428	431
Salt Lake City	441	440	456	439	401	412	412	414	431
San Francisco	374	406	428	417	421	421	421	432	434
Average	417	427	446	429	427	426	426	425	433

During 1923 the average quality of gasoline in the United States underwent no substantial change, as shown by the results of the two motor-gasoline surveys conducted by the U. S. Bureau of Mines which are summarized in Table 3. It is significant that the upward trend in the end-point of gasoline, which was manifest several years ago, has been arrested during the past three years, when the supply of gasoline has been relatively easy. It is fair inference that when the supply of gasoline again runs behind demand, the end-point of gasoline may be expected to increase and the problem of utilizing more efficiently less volatile fuels will again become prominent.

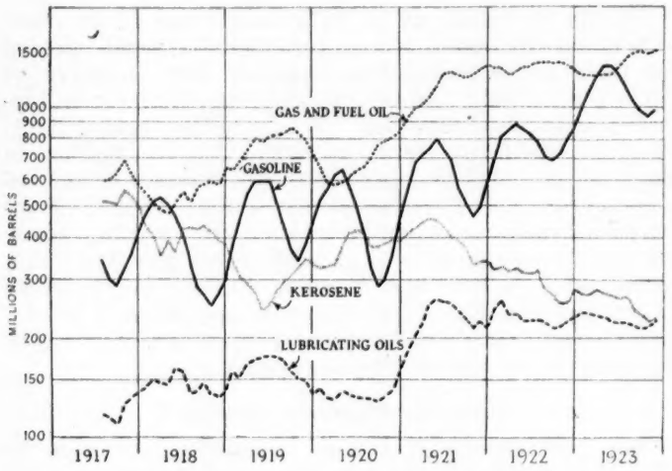

Fig. 7—Trend of the stocks of the principal products of petroleum by months, 1917-1923

The production of gasoline, kerosene, fuel oil, and lubricating oils is shown in Table 4, where the change in output in 1923 as compared with previous years may be seen. It is noteworthy that the greatest increases were registered for gasoline and fuel oil, with the former increasing at a sharper rate than the latter.

The course of stocks of refined oils is shown in Fig. 7 as a good index of the relation of supply to demand. It is seen that stock of kerosene and lubricating oils decreased during the year, with kerosene stocks reaching the lowest levels attained since the beginning of the statistical record in 1907. Fuel oil and gasoline stocks increased in 1923. Attention should be directed, also, to the marked seasonal variation in the stocks of gasoline.

Exports of mineral oils are shown in Table 5 by years from 1913 to 1923 and by months for 1923. In 1923 a sharp increase in the exports of gasoline was registered reflecting the exports of cars and trucks to foreign countries in excess of the growth of foreign refinery output.

The year just closed witnessed a drastic decline in the prices of crude oil and its principal derivatives, with the exception of kerosene. The average prices for the year 1923, however, were not far different from those for 1922, with the exception of the price of gasoline, which averaged 20 per cent lower.

Index numbers representing the average prices of crude petroleum and its principal derivatives, together with the the general price level of the U. S. Bureau of Labor Statistics, are shown in Table 6 for the past two years by months, with yearly figures for the past eleven years. This exhibit gives a summary view of the price movements in the petroleum industry.

Prices Fall

During the first quarter of 1923 oil prices moved sharply upward; during the second quarter they became affected

Table 4.—Trend of the Production of the Principal Products of Petroleum

(In millions of gallons)

By Years	Gasoline	Kerosene	Gas and Fuel Oil	Lubricating Oils
1914	1,500	1,935	3,734	517
1915	....	....	....	....
1916	2,059	1,455	4,664	625
1917	2,851	1,727	6,513	754
1918	3,570	1,825	7,321	841
1919	3,958	2,342	7,627	847
1920	4,883	2,320	8,861	1,047
1921	5,154	1,945	9,664	878
1922	6,202	2,306	10,706	979
1923[a]	7,520	2,330	12,082	1,097
By Months, 1923				
Jan.	624	212	989	87.1
Feb.	569	180	903	77.4
Mar.	631	191	971	90.7
April	619	182	977	90.7
May	632	189	966	105
June	637	179	971	95.7
July	637	188	1,053	94.0
Aug.	649	186	1,011	87.3
Sept.	624	194	1,033	87.2
Oct.	659	191	1,070	88.0
Nov.	618	221	1,058	96.1
Dec.	...	...	....	....

[a]December estimated.

by the oversupply of both crude oil and gasoline; and the third and fourth quarters of the year were characterized by a demoralized market and drastic price declines. Gasoline, in particular, dropped to levels representing 84 per cent of its 1913 average. Expressed in terms of the general price level, gasoline fell to 55 per cent of the average price of all commodities. The last half of 1923 was preeminently a period of cheap gasoline.

The tankwagon price of gasoline is shown in some detail in Table 7 for a number of cities scattered throughout the country. It will be observed that the price movement was fairly uniform over widely separated points. The tankwagon price structure in general moved upward during the first 3 months and downward thereafter. The sharpest declines were registered during August and September, at the height of the motoring season, when consumption of gasoline is at its maximum.

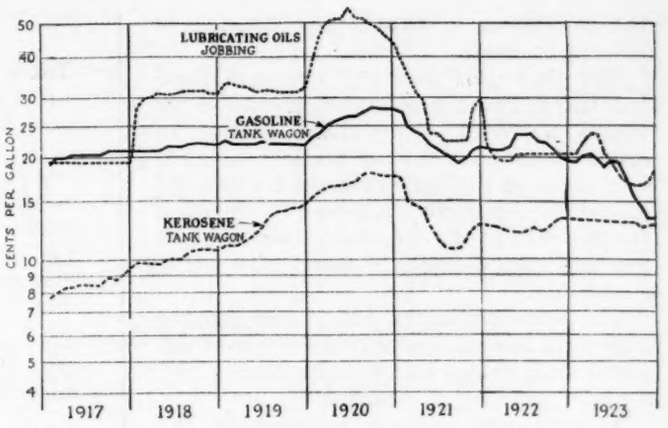

Fig. 8—Trend of the average prices of gasoline, kerosene and lubricating oils in the United States by months, 1917-1923

The trend of oil prices in which the automotive industry is particularly interested—gasoline, kerosene, and lubricating oils—is shown in Fig 8 by months for the past seven years. The outstanding features of the chart are the low levels reached by gasoline and lubricating oils in late 1923, and the high degree of stability displayed by the price of kerosene. The explanation of this difference lies in the fact that gasoline was in oversupply while the output of kerosene did not exceed market requirements. The price trend of lubricating oils during 1923 was influenced more by the price of crude petroleum than by

Table 6.—Trend of the Relative Prices of Crude Petroleum and Its Derivatives in the United States by Years from 1913-1923 and by Months, 1922 and 1923

(Prices in 1913-100)

By Years	Crude Petroleum at Wells	Gasoline, Tankwagon	Kerosene, Tankwagon	Fuel Oil at Refinery	Lubricating Oils, Jobbing Quotations	All Commodities[b]
1913.....	100	100	100	100	100	100
1914.....	83	83	97	85	101	98
1915.....	66	75	90	68	97	101
1916.....	117	121	101	98	119	127
1917.....	155	132	108	147	126	177
1918.....	195	139	130	189	200	194
1919.....	197	142	162	149	209	206
1920.....	302	170	217	262	318	226
1921.....	163	143	164	122	179	147
1922.....	156	140	158	117	132	149
1923.....	150	112	163	113	125	...
By Months, 1922						
Jan.	174	137	161	114	140	138
Feb. ...	174	135	159	113	129	141
Mar. ...	174	136	155	110	126	142
April ...	174	139	153	117	126	143
May ...	174	148	153	118	133	148
June ...	177	151	153	124	133	150
July ...	160	151	156	121	133	155
Aug. ...	133	142	154	119	133	155
Sept. ...	133	142	156	122	133	153
Oct.	133	136	163	118	133	154
Nov. ...	134	128	167	113	133	156
Dec.	138	127	167	111	133	156
1923						
Jan.	148	124	167	118	133	156
Feb. ...	179	129	166	126	144	157
Mar. ...	187	132	166	128	153	159
April ...	185	128	165	124	154	159
May ...	163	121	163	114	133	156
June ...	160	125	162	110	127	153
July ...	149	124	162	106	116	151
Aug. ...	140	110	162	108	110	150
Sept. ...	135	97	162	108	107	154
Oct. ...	123	90	156	106	107	153
Nov. ...	113	84	158	103	110	152
Dec.	112	84	160	103	119	...

[b] From U. S. Bureau of Labor Statistics.

Table 5.—Trend of the Exports of the Principal Products of Petroleum

(In millions of gallons)

By Years	Gasoline	Kerosene	Gas and Fuel Oil	Lubricating Oils
1913.....	188	1,119	427	208
1914.....	210	1,010	703	192
1915.....	282	837	812	240
1916.....	356	855	964	261
1917.....	416	644	1,127	283
1918.....	575	496	1,245	259
1919.....	382	989	692	277
1920.....	657	877	927	405
1921.....	552	757	952	291
1922.....	595	903	776	333
1923[a].....	858	863	1,372	346
By Months, 1923				
Jan.	61.6	94.8	97.2	33.1
Feb.	67.6	61.8	101	22.1
Mar.	69.4	67.2	110	30.1
April	67.6	63.5	100	29.3
May	71.7	55.0	116	42.6
June	75.3	64.8	122	38.4
July	83.7	59.8	121	23.6
Aug.	78.5	80.2	127	22.5
Sept.	75.6	81.7	119	31.2
Oct.	87.2	79.6	131	25.6
Nov.	54.5	74.3	107	22.3
Dec.	....	....	....	....

[a] December estimated.

the conditions of supply and demand in respect to itself.

The year closed with oil prices displaying the beginning of firmness and a reversal of trend. The sharp decline in crude oil production that marked the closing weeks of the year brought a close approach to equilibrium between the demand for the supply of crude petroleum, and oil markets were quick to respond with rising quotations.

The evidence at the year's end created a general impression that the cycle of depressed oil prices had run its course and a major upswing lay ahead.

Nineteen-twenty-three represented the third successive year of overproduction of crude oil. For the past three years oil had been found faster than it has proved possible to consume it. Cheap gasoline has been the result at a time when the automotive industry was passing through a period of phenomenal expansion.

During 1923 eight major oil pools were brought to their peaks of production; the time required for depleting an oil-pool has been appreciably lessened. We are finding new oil all the time, but we are also depleting the known supply with growing rapidity.

Can the supply keep pace with the ever widening demands of automotive transportation? It is not necessary that it should do so. There is a vast untapped reservoir of energy in uncracked fuel oil and in the unharnessed products of combustion. Improved technique which has doubled the rate of crude oil production in the past few years can quadruple the motor-service derived from oil should it become necessary to do so.

Table 7.—Average Monthly Tankwagon Price of Gasoline in Selected American Cities During 1923

(In cents per gallon)

1923	New York	Baltimore	Atlanta	Cleveland	Chicago	Kansas City	Houston	Salt Lake City	San Francisco
Jan.	22.0	21.5	19.0	19.0	18.0	17.5	16.0	20.5	17.4
Feb.	23.1	22.5	21.0	20.0	19.3	18.8	18.0	22.1	17.0
Mar.	24.5	23.5	23.0	21.0	20.0	17.8	19.0	25.5	17.0
Apr.	23.9	22.7	22.8	21.0	20.0	16.5	19.8	24.6	16.4
May	22.0	20.5	21.3	21.0	20.0	16.0	17.5	21.6	16.0
June	21.5	20.5	20.0	21.0	20.0	19.5	16.0	21.5	16.0
July	21.3	20.1	19.4	20.4	20.0	19.5	14.6	21.5	16.0
Aug.	20.0	19.0	18.5	19.3	16.7	16.2	14.0	20.5	13.8
Sept.	19.3	18.3	17.0	18.1	13.4	12.9	14.0	19.5	11.5
Oct.	17.7	17.2	16.2	17.0	13.4	11.7	13.6	18.7	11.0
Nov.	15.8	15.3	13.5	16.3	12.4	10.9	13.0	16.5	11.0
Dec.	15.5	15.0	11.4	16.0	12.4	11.5	13.0	15.6	11.0

A New Fuel Injection System

A FUEL injection system making possible the use of heavy fuels, such as furnace oil, in internal combustion engines has been developed by the Hammer Spray Co. under the patents of S. A. Hasbrouck. Fuel is injected into the cylinders by means of a specially designed pump which has one cylinder for each engine cylinder through a spray nozzle in the wall of the combustion chamber. The spray nozzle is connected to the pump by tubing. The pumps are of the plunger type and are operated by a spring under moderate tension and by a trip cam mounted on a shaft driven from the crankshaft by chain and sprocket or gearing. The spring actuates a trip hammer which delivers a blow to the pump plunger. The stroke of the pump can be varied by means of a hand lever and the timing of the injection can be changed while the engine is running.

When the pump plunger is driven down by the blow of the hammer, the proper amount of fuel is forced through the tubing and delivered in a very fine spray between the valve seat and the valve head, mixing with the air which has been drawn in. Injection of the fuel occurs toward the end of the compression stroke, which probably is the reason that no trouble is experienced from pre-ignition and detonation, according to Mr. Hasbrouck. The spraying of the fuel is said to be so energetic that no difficulties are experienced even in starting from cold on the heavy fuel. The dimension of the pump naturally must be proportional to those of the engine cylinder. The system is said to be applicable to two-stroke as well as four-stroke engines and to both high and low speed designs.

A test of the Hammer Spray system as applied to an old Knox four-cylinder air-cooled automobile engine has been made by Professor Lockwood at Mason Laboratory, Yale University. The engine was mounted in the car and the fuel injection apparatus was fitted in addition to the regular carbureter so that either the Hammer Spray system with heavy fuel or the ordinary carbureter could be used at will. The road tests demonstrated that the car could be propelled by the use of furnace oil with the Hammer Spray device with substantially the same economy and flexibility as with gasoline.

Figures for the Knox car tests with the two fuels are given below. These results were obtained on the rear wheel dynamometer of the Mason Laboratory.

Preliminary tests of Knox automobile, 1912 model, bore 5 in., stroke 4¾ in., comparing Hammer Spray system with gasoline, gave:

	Hammer-Spray Furnace Oil	Carburetor Gasoline
Fuel, kind		
Fuel, specific gravity	.82	.736
Miles per gal., level road, speed 20	16.5	14.7
Miles per gal., level road, speed 30	15.75	14.3
Miles per gal., level road, speed 40	12.85	11.5
Maximum engine hp., speed 20	16.9	16.1
Fuel rate, lb. per hp. hr., level road, speed 20	1.24	1.25
Fuel rate, lb. per hp. hr., maximum load, speed 20	0.875	1.19

Professor Lockwood comments that the tests results are creditable to the injection device and suggests possibilities of importance in the substitution of cheap furnace oil for gasoline. These particular tests are regarded as merely preliminary and not as showing the ultimate possibilities of the new system when used with high compression.

Why the Automotive Industry Should Lead in Accident Prevention

It would weaken sales resistance, build up good will, insure intelligent consideration of traffic problems as well as avert drastic regulation, Price says

By C. W. Price
Vice-president in charge of Public Safety Division, Elliott Service Co.

THIS is the last of a series of three articles by Mr. Price, who is recognized as an expert on the subject of accident prevention.

The first outlined the seriousness of the traffic situation as it affects the automotive industry; the second outlined the activities which have been found most effective in alleviating conditions, and the present article tells what the automotive industry can do to induce communities throughout the country to undertake thoroughgoing public safety work.

NEWSPAPER clippings from every section of the country indicate that every community is looking about for some solution of the traffic accident problem. More direct information which has come to my attention within the last six months indicates that more than a hundred cities are actually starting some sort of safety campaign or talking about such campaigns. In the majority of these cities—because they are at present unaware of the methods that have succeeded elsewhere—the campaigns which are now under way or being organized are superficial, half-baked, merely spectacular affairs, and in many cases mere paper campaigns. The detrimental effect of such campaigns has been touched on in earlier articles.

The first step, which in our judgment should be taken by the automotive industry, is through a committee representative of the entire industry as, for instance, the recently organized safety committee of the National Automobile Chamber of Commerce, which would quickly acquaint itself with the various types of safety campaigns that have been conducted and their varying degrees of success or failure. From the material which will be developed by such a study should be picked the few fundamental activities that have been most effective. With these as a basis, the industry should recommend a standardized program that is simple, workable in any community, and certain of results. The committee should then broadcast this information quickly throughout the country to the leaders of the industry financially affected by traffic accidents and to other men of influence in each community.

The traffic accident problem is not, however, exclusively an automotive industry problem. Steam railroads, electric railways, and insurance companies are also vitally interested in the solution of this problem, and the problem is of considerable importance to public utilities, chambers of commerce, and the commercial users of large numbers of motor vehicles, such as express companies, trucking companies, laundries, bakeries, coal and building material dealers, and numerous others.

The automotive industry should, therefore, secure the fullest cooperation of the national organizations representing all of these interests, and as a first step in this direction should secure the appointment in each such national organization of a committee on cooperation with the automotive industry.

The automotive industry should also immediately set about to get its own innumerable local representatives —including dealers, manufacturers, automobile club executives, and trucking company and taxicab company executives—interested in the subject and acquainted with the methods, so that in each city the automotive men would participate in, if they did not actually initiate, the movement for a safety campaign and would be in a position to guide the campaign in the direction of the important and constructive activities and away from trivial and untried activities.

Cooperative Effort Urged

The next step should be to induce all these interests to saturate their respective local leaders and representatives with the conviction that traffic accidents can be prevented and with information as to how they may be prevented, so that in each community, not only the leaders in the automotive industry, but the executives of the local electric railway, the local representatives of steam railroads, the insurance men, the chamber of commerce men, and the automobile club men would be able to guide the plans for a public safety campaign in the proper direction and, where such plans are lacking, to put life into the movement for an organized community safety campaign.

The campaign to be successful will require intelligent and well-informed leadership in each community. For the representatives of the automotive industry and other cooperating industries to be convinced that it is possible to reduce traffic accidents through a community effort and to know briefly what such an effort should consist of is not sufficient; it is necessary also to build up in the minds of these leaders a complete understanding of the underlying principles of a successful safety campaign. They must, for instance, be made to appreciate

fully the difference between spectacular temporary activities, such as jaywalking demonstrations, professional clowns, or actors, or the use of boy scouts as traffic officers, and permanent, far-reaching activities, such as safety instruction in the public schools and special training of commercial vehicle drivers.

Information on Accident Causes

While the first effort in this educational campaign should be to convince business executives everywhere that it is possible to prevent traffic accidents and how they may be prevented, this effort should be followed immediately by accurate and detailed information concerning the various causes of motor vehicle accidents arranged in the order of their relative importance. The automotive industry should immediately set itself to the task of collecting on a broader scale and in a more accurate manner than has heretofore been done, information concerning the causes of motor vehicle accidents, and should promptly give the most widespread publicity to its findings.

The automotive industry could and should render more direct accident prevention service to the users of motor vehicles than is now the case. There are still to be found in every city automobile dealers who make little or no effort to assure themselves of the ability of a new owner to drive his car safely. A still greater number of dealers—and this is particularly true in the sale of used cars—while they do make an effort to teach the rudiments of driving to the purchaser, endeavor to rid themselves of the pupil as quickly as possible. I have personal knowledge of a number of men whose instruction in driving following the purchase of a new car consisted of a ten-mile drive through the city's streets and into the country and back—the first half of the trip with the instructor at the wheel and the latter half with the purchaser at the wheel. This is particularly true in cases were the purchaser is willing or anxious to learn to drive quickly.

Truck Driver Is Special Problem

The truck driver, as has been pointed out in an earlier article, presents a special problem in the efforts to reduce motor vehicle accidents, and should be recognized as a special problem by the truck manufacturer and dealer. Efforts should be made, not only to instruct him in driving, but to give him an appreciation of the great power to cause or to prevent accidents which he has every hour that he is at the wheel. It should, for instance, be an easy matter for the representatives of the automotive industry in each community to organize a safety school for commercial vehicle drivers, to which would be invited truck drivers, taxicab men, city salesmen using passenger cars, and other motor vehicle drivers who are on the streets the greater part of the day.

The close of a Safety Week campaign which marks the opening of a year round campaign and at which time there is the greatest popular interest in the subject, provides the most appropriate occasion for the inauguration of the school for commercial vehicle drivers. There are, undoubtedly, many other ways which will occur to men in the industry itself in which the industry may render a more direct accident prevention service to the individual car owner, but it is not necessary to discuss them in connection with community efforts for the prevention of accidents.

Now, what would the automotive industries gain from such participation in the movement for the prevention of traffic accidents as has been recommended in this series of articles?

First, with the reduction of accidents that would inevitably follow such activities there would be a considerable weakening of the existing sales resistance created by the constantly growing fear of accidents and by the heavy cost of automobile accident insurance, which is based directly on the cost of automobile accidents themselves.

Second, it would secure an inestimable amount of goodwill as the result of the public's appreciation of the industry's interest in and contribution toward the elimination of a menace which touches every home.

Third, it would secure intelligent consideration for all traffic problems—this nearly always is an outgrowth of the initiation of a public safety campaign in which the business men of the community are leaders.

Fourth, the representatives of the automotive industry and the business men cooperating with them in various local campaigns would have a hand in the framing of traffic regulations in their respective communities.

Fifth, and this is perhaps the most important of all—it would avert drastic legislation such as often results in response to an unintelligent but insistent popular demand, and in lieu of such legislation it would secure regulation based on careful study of accident causes and traffic conditions.

Without the leadership, the cooperation and the stimulation which such a powerful interest as the automotive industries can provide to communities throughout the country, it will take ten years or more to accomplish what might otherwise be accomplished in two years.

New Books Discuss Accounting and Motor Vehicle Lighting

IN Germany, Division 17 (Ignition and Vehicle Lighting Equipment) of the Association of the German Electrical Industry furnishes replacement parts that are not easily interchanged, only to repair shops that have the necessary facilities for making a workmanlike job.

Manufacturers of ignition equipment were forced to this measure, we are informed in a newly issued book (Die Lichtbogen-Zündung nebst Störungserscheinungen, by Herrmann Mertz, published by M. Krayn of Berlin) because they found that attempts to eliminate faults by incompetent parties often made the trouble worse. The book referred to deals with the high tension magneto, or, as the title has it, the arc flame magneto. It covers both the principles of design and troubles that may arise in the use of high tension magnetos, giving rules for the location of troubles and their remedies.

Designers of engines are cautioned by the author to drive the magneto from the crankshaft as directly as possible, without the interposition of a camshaft, oil pump shaft or water pump shaft, because with each gear or chain the angular play of the magneto armature relative to the crankshaft increases. For the same reason there should be no long flexible shaft in the drive. The work under review is in pamphlet form and contains 40 pages of text.

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"DEPARTMENTAL and Standard Costs" is the title of another publication recently brought out by the N. A. C. A. The book was written by William S. Kemp, treasurer, Holtzer-Cabot Electric Co. The author has discussed his subject in great detail and has illustrated his conclusions with forms and tables which make the book of really practical value.

Individual Heat Treatment Will Improve Quality of Product

Special furnaces developed for the handling of piston pins and shackle bolts make it possible to treat each part separately. Specific requirements should determine furnace type used.

By C. N. Dawes
Metallurgical Engineer, Studebaker Corp.

QUANTITY production, which is so familiar to the automobile industry of today, has been the indirect cause of many baffling problems with respect to the heat treatment of steel parts. Demands of present day production have caused us to a great extent to creep away from many of the more exacting methods and care in handling pieces to be hardened, which were peculiar to the tool hardener of a few years ago. Although the tool hardener, who was the foreman of those days, may not have been so well acquainted with the various new types of steel, he tried to handle each piece separately and with all possible care as had been his custom in hardening tools. But that day has passed and the tremendous production of today has resulted in heat treating in large quantities.

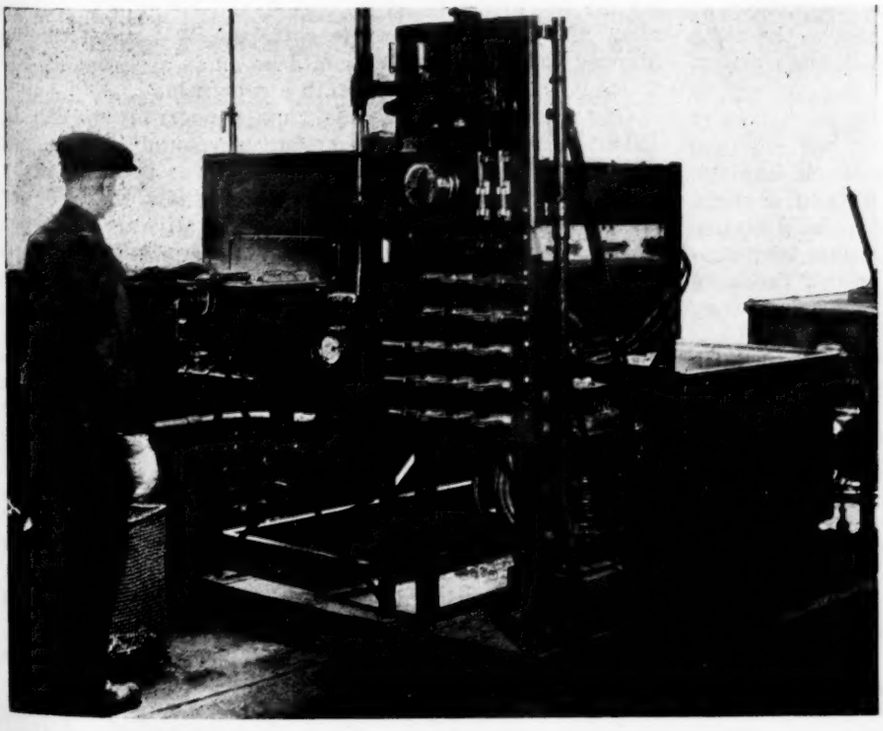
It is no wonder, therefore, that regular complaints of softness, non-uniformity in hardness, warpage, etc., are continually facing us. As a result of exhaustive investigations we have some very valuable information as to probable causes of soft spots on case hardened parts, of warpage of gears, deficiency in physical properties, etc., but we are becoming convinced that by far the greatest percentage of these troubles is due to bulk heat treatment. The greatest difficulty has been with small parts such as valve tappets, piston pins, knuckle pins, pump shafts, bolts, etc.

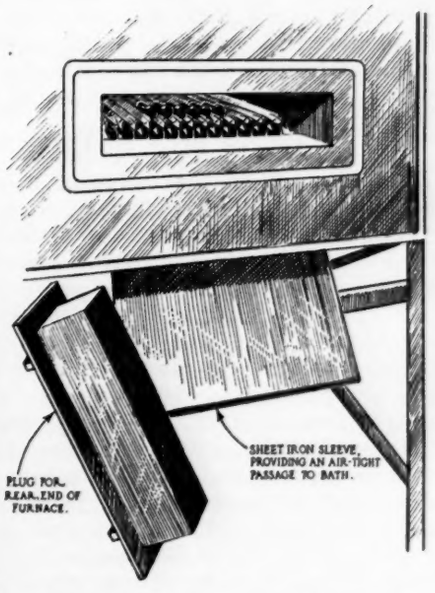
To overcome these troubles and to approach as nearly as possible individual handling of parts in the heat treatment, Studebaker has designed and had built two types of furnace to handle piston pins and shackle bolts respectively. Fig. 1 shows the furnace designed for piston pins. The pins are pushed through tubes, being properly timed to become thoroughly heated before being discharged into the quenching tank. In this particular case five pins are discharged at once down separate chutes, so that each pin is brought into contact with the quenching medium over its entire surface.

Fig. 2 shows the discharge end of the furnace for heating shackle bolts, wherein the bolts are pushed along a grooved floor. In this case thirteen bolts are discharged at one time down separate chutes, each bolt thus coming into full contact with the quenching medium.

The vast improvement resulting from thus handling small parts, as compared with the older method of handling them by the shovelful, is very noticeable, and this is conclusive proof that a great percentage of our former complaints was due to lack of individual handling.

Whether it is better to use electrical furnaces or furnaces heated by other means is a matter to be investigated in each individual case; the main point is that parts should be handled in such a way as to approach individual heat treatment as nearly as possible.





Left—Improvement in furnace for heat-treating piston pins
Above—Discharge end of furnace for heat-treating shackle bolts

Farm Benefits from Better Highways Far Outweigh Their Cost

"What would you do without the service of a car whether you own one or not," Brosseau asks. Profitable markets big factor. "Pay as you go" plan uneconomic

By A. J. Brosseau*
President of Mack Trucks, Inc.

THE first and most important influence of the motor car upon the farmer is its effect upon his family life. That fact is not debatable. I will pause only to ask you one question before passing on to the economic phases which are as yet less generally understood:

"What would happen to America tomorrow if all of the motor vehicles should be withdrawn from service?" Or, to put it in specific form:

"What would you do without the service of a car whether you own one or not?"

Suppose, then, we turn to the economic side of the question. Here, while the transition has been so rapid that there has frequently not been time to gather comprehensive statistical data, on all sides research men are analyzing and evaluating the effects of the motor vehicle. A few of these facts will be of interest and will serve to demonstrate the practical service of highway transportation to other transportation agencies and to the public.

Studies of the Bureau of Crop Estimates of the Department of Agriculture in 1918 show that the estimated cost for hauling in wagons from farms to shipping points averaged about 30 cents per ton mile for wheat, 33 cents for corn, and 48 cents for cotton; for hauling in motor trucks or by tractors the averages are 15 cents for wheat and corn and 18 cents for cotton. While most of this hauling is done by the farmers themselves, the costs are based largely upon the usual charge in the various counties for hiring vehicles by the day.

Trucks Broaden Farm Market

Turning next to the effect of motor truck haulage upon the market of the farmer, we read from a study made by the same department in the corn belt States, of which Illinois is one. This investigation was conducted first in 1919 when the prices for farm products were relatively high and repeated in 1922 when they were low.

The second report showed that 33 per cent of those who answered the department's questionnaire had changed from a poorer to a better market as the result of truck purchase, with an increase in the average distance to market from 8 miles before the change to 16 miles. Before the purchase 73 per cent were using markets less than 10 miles distant, while now 64 per cent go to markets 10 miles or more from their farms and about one-fourth go to markets more than 20 miles away. Incidentally, it is interesting to note that 92 per cent of those who were using trucks in 1919 still use them, and of the remainder half have purchased new trucks to replace the old.

The Department of Agriculture has recently made, in cooperation with the Massachusetts Division of Markets, a cost study of the transportation of Franklin County apples to market by motor truck. Most of the shipments in the past have been by rail from a station called Shelburne on the Boston & Maine Railroad. Comparisons of rail and truck shipments as to distance, time, rates and costs were made with Holyoke, Springfield, Worcester, Boston and Hartford among objective points.

Rail Time Bettered by Motor

In every case the delivery time by truck was less than by rail. Where a carload or less than carload shipment took 28 hours by rail to Springfield, 44 miles away, a 3½-ton truck did the job in four hours and a smaller truck more quickly. The distance to Boston (112 miles) was covered in 12 hours by a 3½-ton truck, 16 hours by a 5-ton truck and required 32 or 50 hours by rail, depending upon the class of shipment.

The investigation further disclosed that the 1-ton truck was cheaper than the rail line up to 22 miles on carload rates and up to 36 miles by less than carload. As the size of the truck increased, the distance increased also, and in each case the Government figures quoted showed that the distance could be made as great as 150 miles if the truck could obtain a return load.

One more statement, this time concerning milk. In 1919 the Department of Agriculture found that 18 per cent of the milk supply of Baltimore was brought in by motor truck, while the 1922 figures show that 36 per cent was conveyed in this manner. In Milwaukee 95 per cent of the milk supply is brought in by truck; in Cincinnati it is said to be 97 per cent. Not only has the change in transport quickened delivery, but more important, the farmer is paid at his door, the first step to a more contented producer.

All of these cases present in a specific, definite form the qualities which the motor truck contributes to lower transportation cost over horse-drawn wagons, ability to obtain new markets, better and cheaper distribution and that speed of movement which is essential particularly in the distribution of perishable goods. None of these studies indicates a replacement of the railroad. They simply present a new service which, as time goes on, will leave the railroad free to handle the profitable long haul and which will eventually make for a more economical operation of the railroads, which should be reflected in lowered costs to the consumer.

Further, they enable the farmer to compare the cost

*Abstract of an address delivered before the "farmer-manufacturer" convention of the Illinois Manufacturers Association at Chicago, Jan. 15.

of local transportation, which Government studies made in 1894 counties have shown to be more than 5 per cent of the total value of the goods transported, with the much longer haul of the railroads, which has been estimated at 6 per cent.

In all stages of the motor vehicle movement, however, whether it be for passenger or commodity purposes, we come first or last to a limitation in the shape of a poor road, and it is in the improvement of these highways that we find the very crux of one of the largest domestic problems facing us today.

"Who is to pay for these highways?" is a question heard everywhere and yet everywhere, too, the people of this country are a unit in demanding better roads. It is unthinkable that we shall seek to deprive the average American of the enjoyment of individual transportation. The problem is to so distribute the burden that, contrary to all of the rules of the game, we shall have our cake and eat it, too, and the interesting thing about that statement is that in this case it can be done!

Fallacies Must Be Broken Down

The most difficult task which faces those who have made an intimate study of the problems of highway finance is to break down the amazing fallacies which exist on every side, one of the most persistent of which is the idea that highways wear out and hence should be paid for out of current account. This is known as the "pay as you go" plan.

The fact is that the modern highway consists of many elements. It has a right of way, a grade, a foundation, drainage facilities and finally a surface. The surface does wear out, but the other features, proper engineering control assumed in their construction, are as permanent as any human structure. When the surface goes all but a small part of it can be salvaged and a better highway surface built at, perhaps, the cost of interest charges on the original investment. Your home is not destroyed when the roof becomes leaky! The surface of the road is its roof!

Another issue, not so frequently heard now, but raised everywhere after the war, was the cry that the truck was destroying the road and hence highway transportation, of which the truck is but the instrument, should stop. The idea that the surface was the road was partially responsible for the belief, but actually, the lack of maintenance in war times was the real cause of road failure. Given constant maintenance and the occasional reconstruction which any roof may have, the rest of the road structure will last indefinitely.

Rational Control Needed

Of course, I do not mean that vehicles of any and all weights should be permitted on any and all highways under any and all conditions. Instead, a rational administration control is assumed which will protect the public from undue damage to its property and yet will weigh all of the facts should an emergency arise. If a man's farm house were burning down he would not want to stop the heavy fire engine beyond his gate, and on the other hand, if a heavy frost impairs a road subgrade temporarily, unduly loaded trucks should be kept off.

Out of these several misconceptions of the highway has come an idea that all expenditures for roads are a current expense which we are not justified in deferring, because to do so would be to burden our children and our children's children with a debt they would have to pay long after the roads are worn out.

Suppose we issue serial State bonds over a reasonable period of years to build our main highways! The dividends which flow back to us pay for them while we use the roads. We pay our share of the cost year by year, adding to the capital investment a little here, a little there through extensions or widening or thickening of the surface, and as we move along we hand the highways over to our children. They must pay their share of course, but it is only a rental charge and they have the roads. Meanwhile, we have given them a heritage in increased valuations far in excess of the charge for highways which goes with it, and we, ourselves, have had the use of the roads.

Influence on Crops

I would not say to any farmer that improvement of the highway along his farm adds one bushel to the fertility of his soil, but it does offer him a chance to grow crops that demand cheap and fast transportation and may bring him nearer the suburban zone. I would not say to any farmer that he should be expected to bear all the burden of what is a general benefit. On the contrary, I believe that one of the ills to which the farmer is heir to just now is the fact that he is in many cases paying more than his share of the cost of this improvement. This must be changed sooner or later.

Fundamentally, as I visualize the highway problem, we have first to consider the routes of intense traffic. Government surveys show that these will not constitute more than 15 to 20 per cent of all the mileage in any State, while as high as 90 per cent of the traffic will flow over them.

Road Types Analyzed

Next come the roads which, whether they be county or local in designation, will for the major part be simply feeders to the main roads. As the improvement of the main system actually begins to be felt, there will be a marked decrease in the traffic on stub lines and thousands upon thousands of miles of this type of highway will actually care for the needs of only the cars of those living along them. Only the lightest type of maintenance will be necessary and this charge the property owner can bear **once the State has assumed its fair share of the burden.**

I believe, and I speak for the motor industry when I say it, that the maintenance costs of the main highway system should be paid for by the car owner. There is a very vital reason why the car owner should pay; it is that adequate maintenance funds are a necessity. They are an annually recurring charge. The motor fee is an annually recurring revenue which almost automatically provides the revenue absolutely needed.

I was much struck recently by an address made by Melvin Traylor of Chicago called "Seeing Things." Let me quote briefly from it in closing.

"Who of us now would willingly return to the conditions of fifty or one hundred years ago? Much of our recent debt has been for good roads. In most parts of the country these cost in the neighborhood of $25,000 per mile, but they add immediate increase value of $10 to $25 per acre to every foot of land they traverse, and they certainly add increased dollars to every item produced on farms bordering or near them, to say nothing of the comfort and happiness, safe and easy traveling over them brings to the rural communities. Would we stop building roads and would it be a good investment to do so?

"If national life is to survive and be happy—and it will be—the homes of the city, the town and the country must shelter in pleasure and comfort a contented people. This can only be done by capital investment that cannot be made, with rare exception, in one lump sum from accumulated savings."

Motor Vehicle Makers Give Increased Attention to Air Cleaners

Five passenger cars at New York show carried these units as standard equipment. Claimed to eliminate various troubles by preventing dust from entering engine with carbureter air. Four different types are marketed for car, truck, and bus use.

By W. L. Carver

AIR cleaners or dust separators for the air intake of carbureters received their first commercial development in connection with farm tractors, but recently manufacturers of trucks and passenger cars have begun to show an interest in these devices. Several new installations appeared at the New York show. This move is in accordance with the general policy of the industry to increase the endurance qualities of its products. Manufacturers for years have been endeavoring to strike a better balance between first cost, ease of service, repair cost and life of their cars.

Under this policy, improvements in engine design have been made affecting the bearing characteristics, crankshaft rigidity and the efficiency of the oiling system. Depreciation in the quality of the fuel supplied in the market has led to a vast amount of study and to the redesign of both carbureters and manifolds. By improving the metering characteristics and the facilities for vaporizing the fuel, both the acceleration and the fuel economy of the cars have been increased.

A thorough analysis of present day engine troubles, such as oil pumping, will reveal the fact that dust entering the engine with the carbureter air has a very harmful effect. It would seem, therefore, that in conformity with the desire of manufacturers for increased endurance qualities of their products, the use of air cleaners on passenger cars might be extended. Increased demand for these devices by truck and bus fleet owners is a clear indication of the trend of the times. Profits in either field are largely dependent upon continuous operation and low service and parts expense, and operators of vehicles of these two types find that the air cleaner is of definite value in lowering costs.

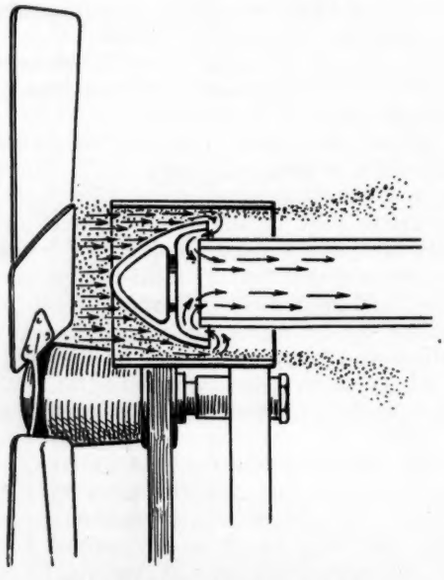


Fig. 1—Rickenbacker air cleaner

Cleaners Reduce Service Costs

Air cleaners, of course, must not be expected to eliminate the service expense caused by normal wear in the engine; they will, however, go a long way toward eliminating untimely service charges accumulating during supposedly normal use. Taken together with the fact that every manufacturer is vitally interested in removing the customer's "service grouch," this should have an influence on the air cleaner situation. It seems safe to say, speaking generally, that those manufacturers whose cars have the highest ratio of resale value to first costs are the most prosperous, which would appear to be an important reason why manufacturers should look carefully after every item affecting the depreciation of their cars.

In addition to the localized demand which has sprung up in the truck and bus fields, air cleaners are standard equipment now on five American cars. The H. H. Franklin Manufacturing Co. have furnished air cleaners as standard equipment for five years and the Rickenbacker Motor Co. have used them for one year, while Chrysler, Gardner and Elgin have just installed them.

The experience of the first mentioned company is summarized in a report in which it is pointed out that since the adoption of air cleaners the formation of so-called carbon in the engine has been decidedly less than is usually found. It is their belief that the use of dust separators has prevented the entrance of dust in the carbureters and combustion chambers to such an extent as to be an important factor in making it possible for their cars to run, in some cases, 10,000, 15,000 and even 20,000 miles before it has become necessary to clean the carbon in the combustion space and grind the valves.

A similar line of thought is set forth by the engineering staff of the Rickenbacker Motor Co. In this case the statement is made that air cleaners were adopted as standard equipment on Rickenbacker cars after extensive tests in which metallurgical investigation showed that the percentage of sand in the carbon deposit in the cylinder heads of automobiles operated on the streets of Detroit varied from 20 to 30 per cent. Since the adoption of air cleaners many analyses of carbon have been made and it has been found that the silicon content amounts to but approximately one-fifth of 1 per cent. This is usually accounted for by a slight amount of air coming through the drain tube in the carbureter.

In the reports of their experience with air cleaners both of these companies lay stress upon the practical absence

of sand or silicon from the carbon deposit. This is important only in so far as it indicates that no material of this character enters the engine and none, therefore, can get on the wearing surfaces. The proportion of silicon found in the carbon deposit is a fairly accurate criterion of the amount which finds its way into the mechanism of the engine. While reduced wear of the working parts is the chief advantage resulting from effective cleaning of the carbureter air, there are several incidental advantages, such as less frequent need for carbon removal and for valve grinding.

Dirt and grit may find its way into the engine from various sources, including the following:

1. Foundry sand remaining in the jackets, etc.
2. Chips and other dirt collected in the machine shop.
3. Dust entering through the carbureter.
4. Dust entering through the breather.

The damage that may be done to engines by gritty material from the first two sources has been recognized in the industry for several years, and methods for the elimination of these sources are in common use. Before delivery to the machine shop the cylinder and other main engine castings are sand-blasted, pickled and in some cases tumbled, which removes the adhering molding sand and the core sand rather effectively. Some manufacturers paint or enamel all unmachined surfaces, and practically all shops clean or wash the finished castings with steam or chemicals before delivering them to the assembly line. Great importance is attached to the effective removal of dirt of all kinds from the engine castings, as it has been found that the presence of gritty matter in the engine may cause endless trouble in the testing department.

Preventing Entrance of Dust

The fourth source enumerated is also of importance as regards its effect on the life of the engine. Many check valves and traps have been devised which permit excess pressure in the crankcase to relieve itself and which apparently keep out dirt. Where the breather also serves as an oil filler, users are warned to clean the surface of the opening before pouring the oil in. A neat solution of this problem of preventing the entrance of dirt through the breather is found on the Velie engine.

The passage from the hot air stove to the carbureter intake is cast in the aluminum cylinder head cover, and a small opening from this passage to the valve chamber, which is in communication with the crankcase, is cored in. As a result, any vapors which find their way from the combustion chamber past the pistons into the crankcase are returned through the carbureter to the combustion chamber, and one free opening from the atmosphere into the inside of the engine is thus eliminated.

Great care generally is exercised to inclose completely and protect against the entrance of dust such parts as the gearset, the axles, the steering gear, etc., but the most obvious source of dust and dirt on the whole car, the carbureter intake, has been generally overlooked. On a car of average power and under normal operating conditions about 40 cu. ft. of air is taken into the engine per minute, and an examination of the space under the bonnet on a car which has been driven a considerable distance under other than winter conditions gives an idea of the kind of atmosphere from which this air is drawn.

As pointed out in the Rickenbacker report, the dust content of the air in the streets of such cities as Detroit is not by any means negligible, and in the country the conditions generally are worse. In that part of the country to the south and west of a line drawn from Savannah to Spokane the soil and, therefore, the road dust is extremely abrasive. The majority of the highways in this section of the country are unpaved, and tests of the deposits on the combustion chamber walls have shown as much as 90 per cent of silicates.

Silicates are abrasives, and the effect of these abrasives entering the engine, on the fits of the wearing parts, may readily be imagined. It is for this reason that many an engine that gave excellent results in the test room has developed oil pumping and other defects in operation after a comparatively short time in the operator's hands.

While it is impracticable to describe all of the different makes of air cleaner that have been developed, descriptions

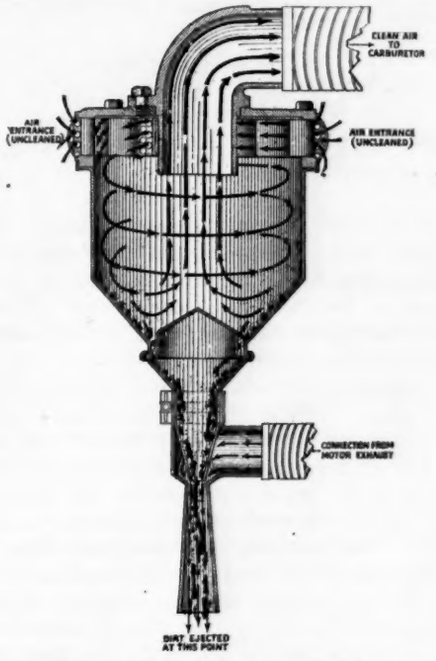


Fig. 2—Stromberg air cleaner

and illustrations of a number of representative makes of each different type will be given to show what has been accomplished in the way of dust separation. When air cleaners were originally placed on the market their efficiency was comparatively low, that is, they removed only a fraction of the dust contained. Through bitter experience both the manufacturers and users soon learned that it is of the highest importance that the maximum possible percentage of the dust should be removed, and that any reasonable effort toward increase of efficiency is thoroughly justified.

Four Types

Commercial cleaners which are applicable to the car, bus and truck field may be divided into four general classes:

1. Separators, depending upon centrifugal force to throw the particles of dust out of the air stream, the direction of which is sharply changed or reversed at the entrance of the cleaner outlet line. The dust particles are ejected from the cleaner or collected in a retainer which requires occasional cleaning.

2. Oil filters, which usually are combined with features of the first type. A perforated container filled with organic fibers or fine wires, which are oil-impregnated, is placed at the inner opening of the cleaner outlet pipe. In practically all cases the heavier dust particles collect in a sump or separate container. Occasional attention is required for the purpose of cleaning out the accumulated dirt and washing and reoiling the filter.

3. Filters which are fitted with large sheets of felt or other fabric having no straight-through openings. The

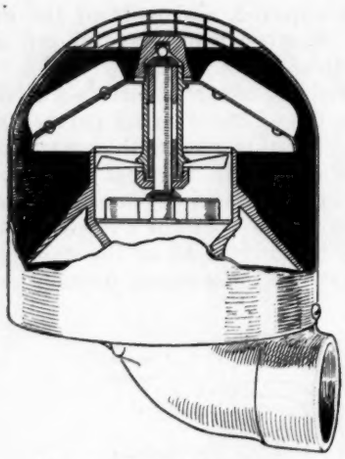


Fig. 3—United air cleaner ejector type

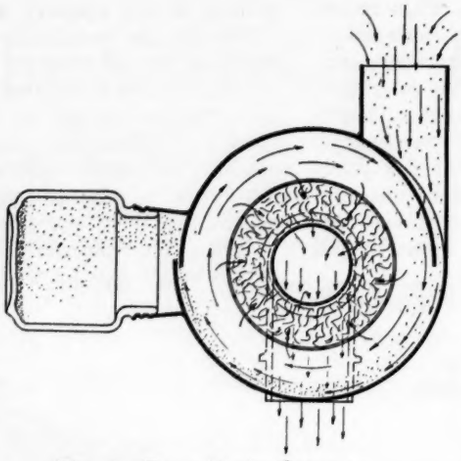


Fig. 4—Bennett air cleaner

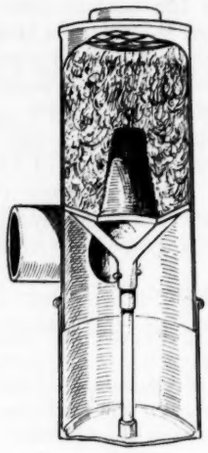


Fig. 5—Pomona air cleaner

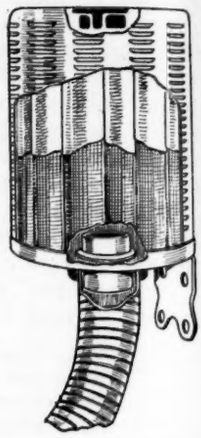


Fig. 6—Protectomotor filter

fabric screen walls are arranged vertically, and because of the large area and consequent low velocity of the air stream through them the greater portion of the dust particles fall out of the bottom of the device. Some types require cleaning from time to time, while others require no cleaning for an indefinite period.

4. Air washers, in which the incoming air is passed through a water bath or intimately mixed with a spray of water. In some cases kerosene is recommended for winter service. The dirt is collected as a sludge in the bottom of the tank or a separate container. The efficiency of the cleaner is largely dependent upon the maintenance of the water level, but considerable progress has been made in the reduction of water consumption. The intake stream is charged with a small percentage of water vapor.

The Rickenbacker separator, Fig. 1, belongs to the first class and depends for its action on the divergence of the air stream at a bullet-nosed deflector which is placed immediately back of the radiator fan. The dirt particles are thrown out against the cylindrical shield and are carried out of the device, as the direction of the air stream is sharply reversed at the rear end of the deflector which masks the opening of the air intake pipe. To insure effective separation a certain air speed is required, and this velocity is built up by the fan as the car attains any speed.

Another type is the Stromberg, illustrated in Fig. 2. In this design the air is introduced tangentially through louvres at the top of the outer tank. The louvres are protected by a perforated screen which diverts much of the dirt as it approaches the openings at low velocity. Owing to the tangential direction of the air currents at the inlet, the incoming stream tends to swirl, and centrifugal action throws dirt and dust against the outer wall, down which they descend into the inverted conical bottom, from which they are ejected through a nozzle which derives its energy from an exhaust connection. The system is so proportioned that a slight downward draft exists at all motor speeds. In this cleaner, again, separation is effected by diverting the air stream.

Separation Effected by Mechanical Means

Some other cleaners employing the same separation principle are made with a dead space instead of the injector at the bottom of the device. A metallic extension with a screw cap or a glass jar is placed at the bottom to form the receptacle for the separated dirt. Cleaning out is accomplished by removing either the cap or the jar while the engine is at rest.

In the United air cleaner, illustrated in Fig. 3, separation is effected by mechanical means. This cleaner is standard equipment on the Franklin, Chrysler, Elgin and Gardner cars. The impeller, which has a conical top provided with radial vanes, is driven by a fan in the air intake or cleaner outlet line. The impeller assembly, of aluminum and pressed steel construction, and therefore of very light weight, is mounted on impregnated wood guide bearings and a single ball thrust bearing. The centrifugal action of the top of the impeller throws the dirt against the wall of the bell-shaped housing, from which it is discharged through the open bottom by means of the excess air current. In this case separation is accomplished by the sharp reversal of the direction of the air stream at the lower rim of the impeller head. This cleaner is also made in a collector type having a dead air chamber at the bottom which must be cleaned out occasionally.

Dust Carried Away from Cleaner Outlet

The basic principle of these three cleaners is much the same, although they are dissimilar in design. The dust-laden stream is directed in such a manner as to carry the particles of dust, which have a much higher specific gravity than the air, away from the cleaner outlet. The stream is led into this outlet at a sharp angle or almost reversed. Because of their greater weight, the dust particles are carried by momentum past the outlet orifice into the atmosphere or a container.

Two cleaners of the second class which are now actively in the market utilize centrifugal action for the separation of the heavier particles and then pass the air stream through an oil-soaked screen which presents a complex passage with tacky surfaces.

In the Bennett cleaner, Fig. 4, the intake connects tangentially with a narrow cylindrical chamber with horizontal axis. The centrifugal action throws the dirt against the outer wall and sweeps it along, and a lip at the bottom of the cylinder acts as a collector which discharges into a detachable glass jar. An annular container filled with organic fibers extends across the entire space between the two heads and is secured to a detachable cap at the head opposite from the outlet elbow to permit removal for cleaning. As the air passes through the fibers, which are oil-impregnated, any residual dust is removed and the clean air passes into the inner tube which registers with the carbureter connection elbow.

The manufacturer states that the jar gives a visible indication of the amount of dust collected and makes clear the necessity for cleaning. When the jar is nearly filled it should be cleaned out, and at the same time the screen should be removed and immersed in gasoline to wash out any accumulated dust. The screen is dipped

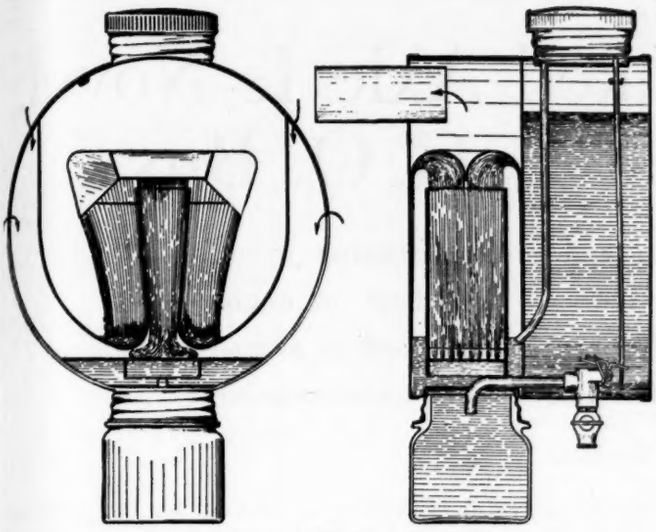


Fig. 7—Stewart-Warner air washer

into medium grade lubricating oil and allowed to drain before being replaced.

The Pomona cleaner, illustrated in Fig. 5, combines the principles of centrifugal action and of a tortuous filter in an entirely different way. In this design the cylinder is vertical, the tangential intake being located a short distance from the bottom, which is closed by a detachable cup containing oil. Baffles above the centrifugal chamber inclose the filter, which is made of very fine wire or organic fiber. The incoming air creates a whirlpool of oil in the lower part of the device, the wall of the centrifugal chamber being wetted with oil, and this oil retains the dust particles thrown against the wall by centrifugal action, washing it down into the bottom cup. The whirlpool action also is said to clean the screen at the top, eliminating the necessity for cleaning and reoiling. The collected dirt is removed occasionally by taking off the bottom cup, the oil supply being renewed at the same time.

One example of the third class of cleaner is the Protectomotor filter, illustrated in Fig. 6. A cylindrical shell having several rows of horizontal intake louvres incloses a multilobed felt screen of large area. The lobes of the screen surround a central circular frame that registers with the outlet pipe. The felt in the filter is specially prepared in one piece and resembles billiard table cloth, being fairly thick and having no straight-through openings. As the velocity of the air when striking the felt is very low (less than ½ per cent of the velocity in the intake manifold, according to the manufacturer) and as, moreover, owing to the shape of the louvres, the incoming air does not impinge directly on the felt but contacts lightly at low velocity; much of the suspended dust is separated at this point and is shaken off by engine vibration or road shocks. As the result of this action it is stated that cleaning of the screen is not required.

Incoming Air Mixed with Water Spray

One type of washer is shown in Fig. 7. This device is made by the Stewart-Warner Speedometer Corp. The incoming air is intimately mixed with a finely atomized water spray which collects the suspended dust. Baffles remove the excess moisture from the air stream before it leaves the cleaner and the dirt is collected in the glass jar at the bottom. The manufacturer states that a design is now ready which obviates the objectionable feature of a large tank and consequent difficulty of installation under the car hood. In the new design the supply tank is separated from the atomizing and cleaning portion and may be made in any size or shape and placed in the most suitable location.

The cleaners which have been described are made in several different sizes to suit engines of different displacement and speed. The effect of most of them on engine output, manifold depression, etc., has been examined by Arthur H. Hoffman of the University of California, whose results were published in a paper which was abstracted in AUTOMOTIVE INDUSTRIES of Aug. 16, 1923. With the designs involving collectors, the frequency of cleaning or unloading depends upon local conditions. In some experimental work this proved to be a very good index of the amount of dirt which would have otherwise passed into the engine.

Aside from the use of air cleaners as standard equipment on five makes of cars, several of the cleaners described are being specified regularly by municipal and State commissions as well as by operators of truck and bus fleets.

New Ideas in Stream-lining Arise from Wind Tunnel Tests

When Rumpler, about two years ago, came out with his new car in which the power plant is located at the rear, he asserted that in designing the body he had been guided by the form of a falling raindrop. He claimed that a raindrop, under the influence of the air resistance, automatically assumed the form most favorable to high speed. These claims are now contradicted by P. Jaray, another German engineer, who also has occupied himself with the design of low air resistance or streamline bodies and who has been guided mainly by the results of wind tunnel tests.

Jaray says (in an article in *Allgemeine Automobil Zeitung*) it is quite true that when a drop of water detaches itself from some solid body it assumes what might be described as a pear-shaped form, being then under the combined influences of gravity and surface tension. A free falling drop, however, cannot possibly have such a form, for one reason, because it would be entirely unstable.

A body of this form (blunt in front and pointed at the rear), if allowed to fall freely, will begin to somersault after a few yards and will then fly with a rocking and swirling motion, chiefly with its longitudinal axis across the line of motion. To stabilize such streamline bodies they must be provided with keels or appendages (tail surfaces) similar to the fish tail and bird tail, at the rear.

The explanation given may not appeal to some people who may have the impression of having seen water drops blunt at the bottom and tapering down to a point at the top. Of course, when a drop hangs from a solid object and is at the point of leaving it, it assumes a sort of pear-shaped form, under the combined effects of gravity, cohesion and surface tension. But at the moment of detachment the drop changes to a spherical form, and it retains this form, except for a slight vibration due to external causes, such as the detachment of the drop.

Lord Raleigh, for instance, has determined that for a drop of 0.2 in. diameter the duration of the vibration is 1/32 second. A falling drop must inevitably assume the form having the least surface area for a given volume, viz., that of a sphere. This at once makes it clear that between the form of such drop and the streamline form of a fish there is no resemblance and that it is incorrect to speak of the form of a drop as an ideal from an aerodynamic standpoint.

Worm Driven Cranked Axle Is Novel Feature of Latest L. G. O. Bus

Final reduction by internal gear and pinion running in oil. Pressed steel frame has one pronounced drop back of engine and another aft of rear axle. Rubber buffers used to supplement springs. Helical gears replace chain in new transmission.

By M. W. Bourdon

IN AUTOMOTIVE INDUSTRIES of June 21, 1923, an outline of the design features of the latest type of London bus was given, but at that time information concerning many details of its construction was not available.

Since midsummer the new bus has been finding its way onto London streets in ever-increasing numbers and has entirely justified its radical departures from previous designs.

The Associated Equipment Co., which is the manufacturing organization of the London General Omnibus Co., has decided to offer the new bus to provincial operating companies and to those in overseas countries, fitting an appreciably larger engine, a four-speed gearset and a rear axle capable of carrying greater loads. These modifications are considered desirable owing to the widely varying conditions as to road surfaces, gradients, and load that must be allowed for where the chassis is to operate outside the London area.

Latest, Model N. S., bus seating 50 passengers, now being used extensively by London General Omnibus Co.

The prime objects of the chassis design are to provide a lower floor level for the body and a lower center of gravity.

So far as the engine, steering and driver's position are concerned, the new type, termed the N. S., is almost identical with the S type, which has until now been the most advanced design. The new model has a still longer wheelbase than the S type (186 in. as against 179), but this addition has been utilized to increase the space available for passengers.

Chassis parts include a Hele-Shaw clutch, three-speed gearset with all pinions, except those of the reverse, in constant mesh and of the helical tooth pattern; open propeller shaft, worm drive in axle center, internal gear drive to the rear wheels. A remarkable feature of the worm gear is the use of an 11-start worm, giving a ratio of approximately 2 to 1.

Alongside the engine, the top of the frame sides are practically the same height as in the S type, 32 in. from the ground. Behind the engine the frame drops to a height of 19.6 in., or nearly 12 in. lower than in the S type. Over the rear axle the frame is arched to a maximum height of 27.5 in. and drops to 11.8 in. for the rear platform. Thus there is but one step from the ground onto the rear platform, with a low second step into the bus interior. The heights apply to a loaded bus with 41 in. rear wheels on solid tires.

There are five main cross members of steel tubing and another of smaller diameter under the radiator; also two transverse forgings from which the engine is hung.

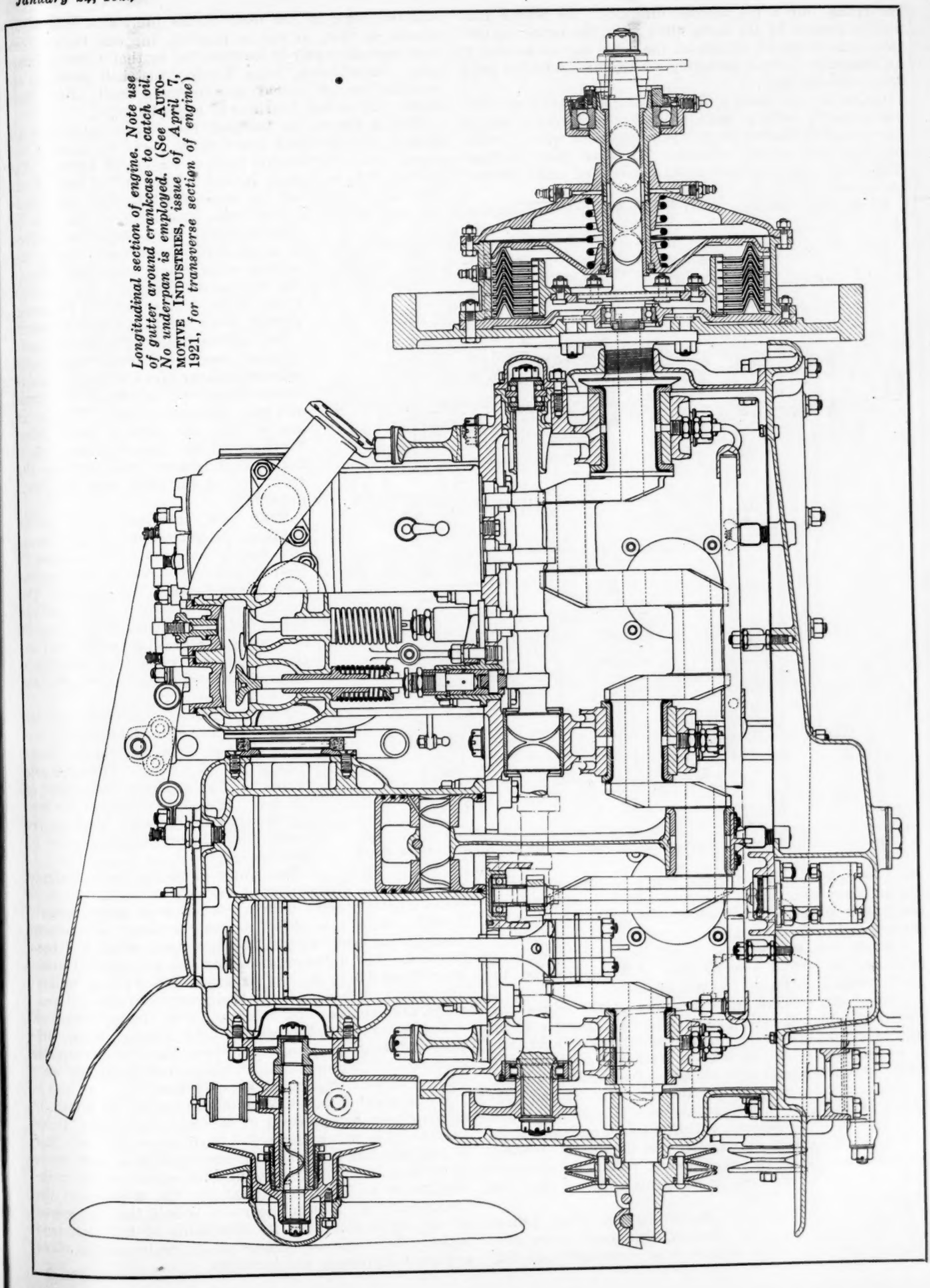
Half-elliptic front springs are 43¾ in. long, and the underhung half-elliptics in the rear are 60 in. long. Supplementing the rear springs to care for the additional load imposed by approximately the second half of the full complement of passengers are a pair of barrel-shaped rubber buffers, secured to frame brackets and making contact with cups above the axle, from which guide spindles project upward into a hole in the rubber. These buffers displace the flat-sectioned volute springs originally used in the S type buses and, although they need to be renewed each six months or so, they have proved more satisfactory than the volute springs.

To provide a straight-line drive to the worm shaft below the rear axle the four-cylinder engine is inclined to an angle of 9 deg. as compared with 5 deg. in the preceding type chassis. This has necessitated a slight modification in the design of the oil sump and one or two other details. The 4¼ x 5½-in. engine develops 36 b.hp. at 1000 r.p.m.

Cylinders are in pairs with integral L heads, the valves being slightly inclined to reduce the area of the pockets. Straight-side aluminum pistons are used, ignition is by magneto, water circulation by pump located in the cylinder jacket at the rear end of the belt-driven fan shaft, adjustment for the belt being provided by the driven pulley having one flange adjustable axially on its hub.

A thermostatic valve in the jacket outlet has effected a small improvement in fuel consumption in winter.

The engine is suspended from two forged steel arches passing above an extension of the aluminum crankcase at each end. The two long suspension bolts at the front end are close together but those at the rear are more widely spaced, an arrangement giving in effect a three-point suspension. The engine as a unit can be lowered clear of

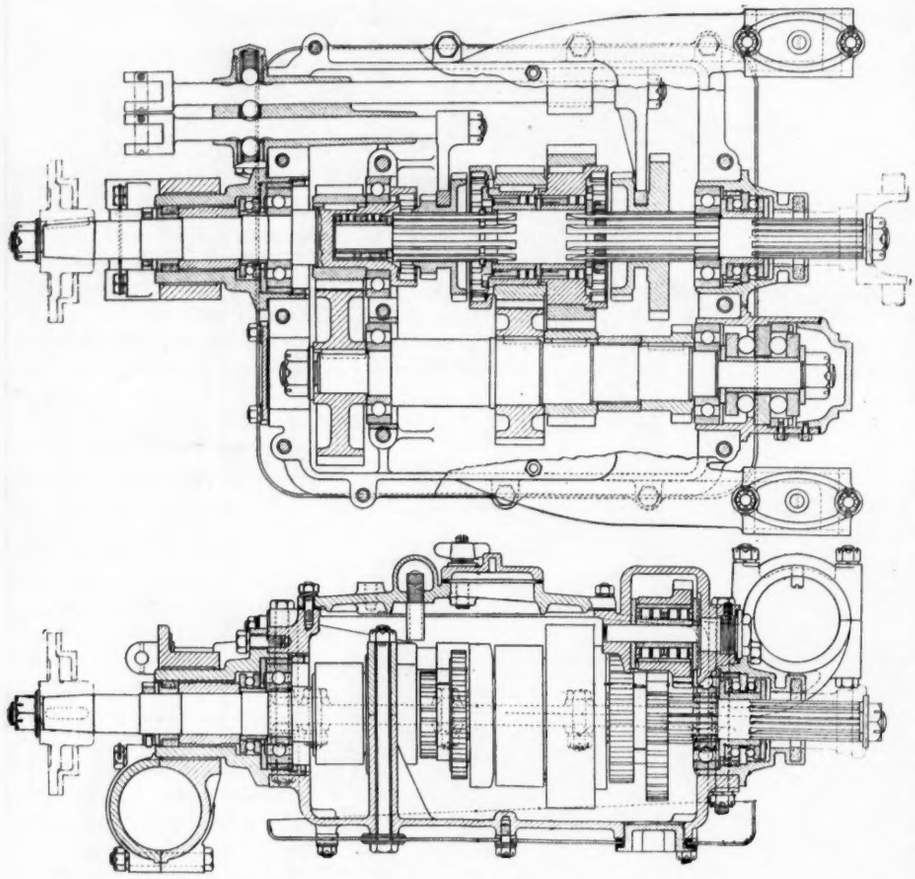


Longitudinal section of engine. Note use of gutter around crankcase to catch oil. No underpan is employed. (See AUTOMOTIVE INDUSTRIES, *issue of April 7, 1921, for transverse section of engine*)

the frame into a pit without difficulty. To permit this and to comply at the same time with the police regulations concerning oil drippings, the sump has all around it an integrally formed guttering which eliminates the need for a separate tray.

On the S type buses a single-plate clutch has been used satisfactorily with a large proportion of drivers, but it has tended to become fierce when abused or when springs have not been equally adjusted. The Hele-Shaw multiple disk clutch now used has seven driven and eight driving plates running in oil.

In the short coupling shaft between clutch and gearset



Sectional views of gearset, which is a constant mesh, helical tooth type. Note the roller bearings used inside the gears which are loose on their shaft

are two Spicer universals, the shaft being solid and of 1¼ in. diameter. The change of clutch is said to have resulted in smoother engagement and marked economy in gearset and body upkeep.

The cast iron gearset case is split horizontally, with the main and lay shafts side by side. Like the engine, the gearbox has a guttering to catch oil leaks.

Two of the tubular cross members of the frame support the gearset at three points. The two supports at the rear consist of projecting brackets with caps to hold them up to the tubes. At the front a bracket projects upward from the tubular cross member and serves to form a longitudinal trunnion support for the extension of the gear casing inclosing the front end bearings of the main shaft.

In designing the gearset, which is by no means a cheap unit to produce, the aim has been to obtain the quietest possible running on all ratios and to reduce maintenance cost, which is of far greater importance than initial cost in connection with buses.

All gears except those of the reverse are of the helical type constantly in mesh. Herringbone gears were considered, but the single pattern was eventually adopted, and the angle of the teeth of the individual wheels arranged so that, as far as possible, the end thrust from each secondary pair is counteracted by that of the primary pair. Nevertheless, large double-thrust ball bearings are provided for the layshaft and the main shaft. Both these shafts run on ball bearings of a special type.

Sliding sleeves for bringing the desired ratio into use embody straight-tooth gears which serve as clutches and engage with the internal teeth of the driven pinions. The sleeves slide on splines formed on the driven half of the main shaft, while on the same shaft the helical pinions run on a special type of roller bearing used also for the pilot bearing. The gears are shifted by a side lever operating in a gate, the selector rods being continued outside the box and linked to the selector forks under the separately mounted sliding lever shaft farther forward.

Behind the gearset the 2½-in. open tubular propeller shaft with solid splined ends engages with the sleeve extension of the halves of the front and rear universal joints. The latter are of the star pattern with roller bearings for the trunnion pins. Sliding motion is permitted between the front end of the shaft and the front universal.

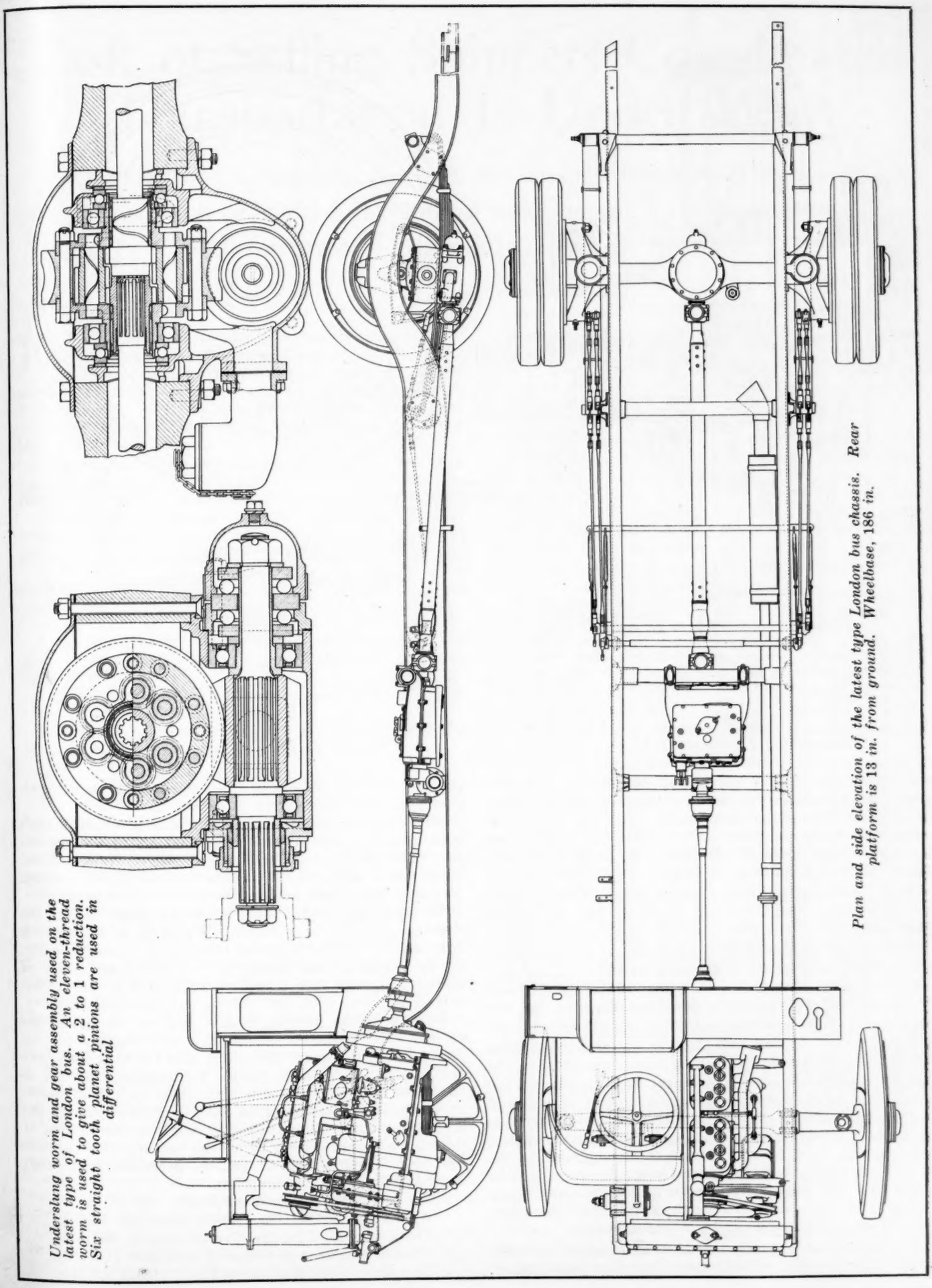
Rear axle construction is unlike anything yet produced in British practice and is believed to be unique in having a worm drive in conjunction with internal gears at the wheels. The main axle is a steel forging with a horizontal double banjo type center of only 9½ in. internal diameter and upturned integral ends into which are secured the separate stub axles for the wheels.

For the brake camshafts and the pivot pins a Y-branched bracket extends upward from beyond the inner ends of the stud axles. The stub axle center is 5¾ in. above the center of the main axle; it is hollowed by boring through the greatest part of the length and is 3⅜ in. in diameter at its inner end.

The worm drive has been designed to reduce the dimensions of the axle center to the minimum commensurate with a reduction of approximately 2 to 1. With this object a straight worm with eleven threads engaging with a 23-tooth worm wheel has been evolved. The differential casing has an internal diameter of but 5 3/16 in. Six straight-toothed planet pinions are used, and these, despite their seemingly small dimensions, are capable of carrying well over the load imposed.

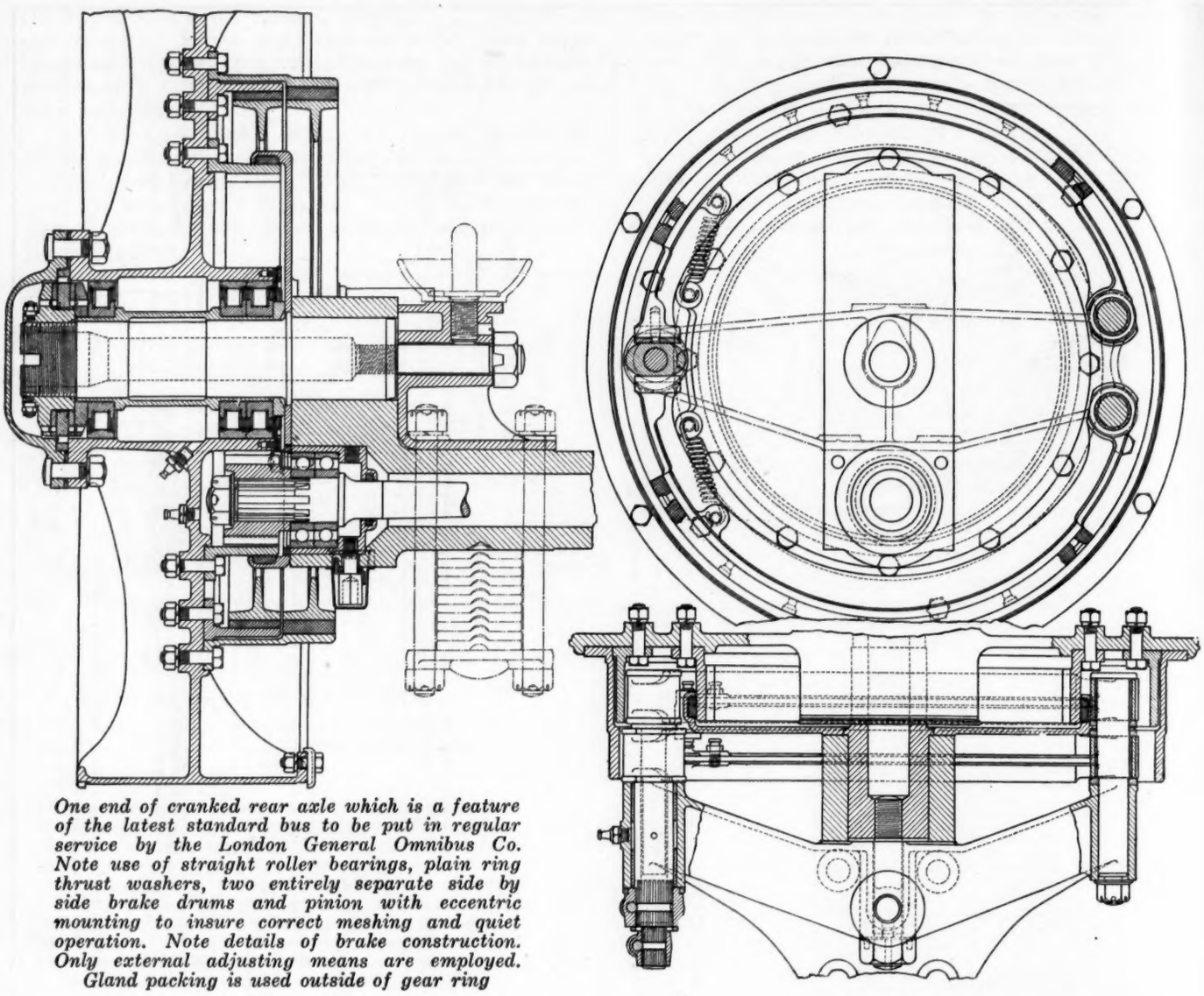
Designing and generation of the 11-start worm presented difficult problems, but these have been overcome successfully. Production methods as well as design were evolved under direction of Kerr Thomas.

Worm gearing and differential are carried as a unit by an aluminum bottom cover of the banjo main axle. Drive shafts of 1¼ in. are carried at their outer ends in a pair of ball bearings located eccentrically within a short sleeve in the axle casing. The eccentricity permits a few thousandths of an inch adjustment for the meshing of the pinion with the internal gear. It is held that the length of the drive shaft and its mountaing at the inner end makes this slight adjustment of its center at the outer end quite legitimate and harmless.



Underslung worm and gear assembly used on the latest type of London bus. An eleven-thread worm is used to give about a 2 to 1 reduction. Six straight tooth planet pinions are used in differential

Plan and side elevation of the latest type London bus chassis. Rear platform is 13 in. from ground. Wheelbase, 186 in.



One end of cranked rear axle which is a feature of the latest standard bus to be put in regular service by the London General Omnibus Co. Note use of straight roller bearings, plain ring thrust washers, two entirely separate side by side brake drums and pinion with eccentric mounting to insure correct meshing and quiet operation. Note details of brake construction. Only external adjusting means are employed. Gland packing is used outside of gear ring

Internal gear rings are bolted directly to the rear wheels and the whole gearing runs inclosed and constantly lubricated. Aluminum coverplates with felt glands in contact with the rotating unit incloses the gears from the inside. The ratio of this final drive is 19 to 84, giving a total reduction on high of approximately 9.2 to 1.

Rear wheels run on three roller bearings of the parallel-side type. End thrust is taken within the hub cap by five plain adjustable rings, two of bronze and three of steel.

Both sets of brakes operate within drums of large diameter (22¼ in.) attached to the rear wheels. The friction surface of each drum is 2⅛ in. wide. Brake shoes, which are faced with fabric, are of identical diameter, but the regulations of the licensing authority call for two entirely separate sets of brakes, and this has necessitated making the drums separate and attaching them separately to the wheel. As a result the drum nearer to the center of the chassis has an extension to the wheel concentric with and inclosing the other. Its friction surface has to be made of slightly larger internal diameter in order to obviate any possible need for the set of shoes applying to the other drum having to be contracted when the wheel is to be taken off. The increased diameter of the shoe and lining assembly is obtained by using a thicker facing, thus allowing the shoes themselves to be interchangeable.

Brakes are cam-operated and have external adjustments only. These consist of adjustable coupling rods and, in addition, levers mounted on fine castellations on the camshafts to allow their angles to be reset.

The H-section front axle has an almost straight beam with upturned ends in which the swivel pins are stationary. The latter are inclined and the wheels cambered, but neither to a sufficient extent to give center point steering. Knuckles have plain bushings and ball thrust bearings.

To allow the drag link to be on the same side as the steering gear, the gear housing is secured to the extreme front end of the frame, giving the column a rake of 24 deg. on the standard bus, though it is adjustable in case of need. The drag link therefore runs back to the swivel axle arm. Both drag link and tie rod have ball joints.

Fuel is fed by gravity from a tank at the left of the driver. The induction manifold is a Y-casting the interior of which is made smooth by filling it with steel balls and rotating it for some time. An important feature of the water jacketed induction manifold is the provision of venturi passages at three points; at the ends of the branches they are integrally cast, while at the bottom of the stem a separate liner forms the venturi. This scheme has been found to discourage fuel deposition and result in a slightly lower consumption.

A few important dimensions follow:

Wheelbase ...186 in. Width of frame 39.3 in.
Track ..... 72¼ in. Overall length..303½ in.
Ground clearance at center of back axle...5½ in.
Tire size (solid, dual at rear)....1050 x 120 mm.

Task of Selling Shippers Coordinated Transportation Is Under Way

Reports of committees which have studied important phases of problem presented at regional meetings of U. S. Chamber of Commerce. Automotive leaders speakers.

By James Dalton

EFFORTS initiated by the Chamber of Commerce of the United States to bring about practical coordination of transportation entered upon its fourth phase at Philadelphia last week when a complete report of the progress made thus far was presented at the first of a series of regional meetings. The steps which have been and will be taken, in order, follow:

1. Appointment of committees to consider the five most important phases of the problem, including the relation of highway transport to other forms.
2. Concrete reports and recommendations by the committees, based upon a thorough and painstaking investigation.
3. Presentation and acceptance of the reports at a transportation conference held at Washington which was attended by transportation experts from all parts of the country.
4. Presentation of the reports and recommendations at four regional meetings of the United States Chamber of Commerce.
5. A referendum vote by the members of the Chamber upon the major questions involved.
6. A campaign of education to "sell" the shippers of the country on the proposals finally accepted.

Historic Prejudices Eliminated

The program thus far has been worked out in orderly sequence. The results already attained have been worth all the effort the various surveys have cost. Historic prejudices and misunderstandings have been eliminated and a platform has been found upon which all can stand, although a few minor modifications may be necessary.

A long forward step has been taken to establish highway transport in its rightful place. The field in which the motor vehicle can operate economically and advantageously as a common carrier of passengers and freight has been clearly defined. Steam and electric carriers have accepted it as a member of the family and have assigned to it, in theory at least, highly important duties. The change in sentiment in the past year in this respect has been little short of amazing.

Significant of the new feeling toward the motor vehicle was the address of Samuel Rea, president of the Pennsylvania Railroad System, at the Philadelphia meeting. As executive head of one of the country's greatest railroads, he spoke with authority and probably voiced the sentiments of the principal railroad executives of the country, although it must be admitted that his company has gone farther than any other in actually using the motor vehicle to supplement its service.

Taking as his subject, "Practical Steps Which Should Be Taken to Improve Our National Transportation System," he said, in referring to motor vehicles:

"Demands for transportation service in the last year have been the greatest ever known in peace times, and I have no doubt that even these high records will be surpassed in the next period of general business activity.

Railroads Wholesale Carriers

"The railroads are, however, transportation machines which are becoming increasingly adapted to the rendering of service in bulk. We may regard them as the mass, or wholesale, carriers of the nation. As their equipment, yards, terminals and other facilities become increasingly adapted to this purpose, they become less adapted to the retail forms of transportation—such as short-haul traffic and less-than-carload freight and the shorter distance light passenger service.

"These forms of service in some cases are a positive burden to the railroads. They are essentially the forms of service which motor vehicles or rapid transit lines can perform to the greatest advantage, owing to their greater flexibility of movement. We are, therefore, confronted with the question of the desirability of encouraging the further transfer to motor trucks and passenger motor vehicles of considerable portions of these kinds of traffic.

"We have also to consider the advisability of the abandonment of totally unremunerative branch lines where public patronage has been transferred chiefly to motor cars and the highways. It seems not unreasonable to say that, either in the case of freight or passengers, when patronage becomes too thinly spread by reason of being divided, the public should be called upon to say which kind of service is desired. Where there is a marked preponderance of choice in favor of the highways and motor vehicles, the railroads should be allowed discretion to abandon the field altogether, so as to concentrate their facilities in other directions and thus serve a greater demand.

Revision of Rate Structure

"This subject is also intimately allied with the question of the revision of the rate structure. Permitting the railroads to raise rates on those forms of merchandise or other products which do not now pay their proper share, as measured by their value and the cost of handling, would permit a corresponding lowering of rates on certain primary commodities which are less able to bear the burden. It would also probably have the effect of giving further impetus to the shifting of high class, small lot short-haul merchandise traffic into the motor truck field.

"This clearing away of unremunerative traffic, for which other and better adapted agencies are now available, instead of reducing the scope of railroad opera-

tions, would leave room for a vast increase. It would clear terminals for the long-distance traffic which the railroads can handle with incomparably greater efficiency than any form of motor vehicle and which is certain of continued growth. It would prolong the life of existing terminals and so help solve the extremely serious problem of providing more terminal room in our great cities, where realty values are becoming increasingly prohibitive. It would simplify railroad operation, and, by increasing the percentage of heavy tonnage movement, would also tend to increase materially the ton miles and passenger miles which a given working force would be capable of handling in a given period of time.

"Although no definite program for meeting these problems is yet fully developed, they nevertheless deserve the most intelligent consideration by both the public and the railroad companies, and also by the interests engaged in manufacturing motor vehicles and all others concerned in commercial motor transportation.

Credit Must Be Stabilized

"The related question of increased or additional physical facilities and the character which they should take to improve efficiency and to lay foundations for cheapening the cost of transportation, brings us immediately back to that most fundamental of all railroad problems —the restoration and stabilizing of credit. Until that problem is assured of solution, no practical program for the sustained betterment or improvement of railroad facilities on any substantial scale is capable of formulation."

Discussion of Mr. Rea's paper was led by A. J. Brosseau, president of Mack Trucks, Inc., and a director of the United States Chamber of Commerce. He began by complimenting Mr. Rea for his broad personal viewpoint and that of his company. In his address, Mr. Brosseau said in part:

The milestones of economic progress are the elimination of waste and time.

If that striving for individual expression which is symbolic of America is to be successful, research and industry must constantly provide us with improved methods.

The machinery which was ample for the requirements of the living standard of but two generations ago is inadequate for the needs of today.

In no field is this more true than in transportation, the keystone upon which the arch of prosperity is erected.

Pioneering Days Are Gone

We have passed beyond the days of the pioneer whose restless spirit constantly impelled him forward to unknown lands. We have come to the day when we must explore those frontiers which lie at our very doors.

We must strike down the barriers of habit which stand in the way of the advance of transportation in order that we may more fully meet those service demands of the individual and his family which, after all, are the sole reason for civilization.

In the past, the energy and will of the great railroad builders created a vast network of transportation arteries which are today performing a splendid and essential service despite innumerable handicaps.

No country in the world has a finer railroad system than our own, none has been constructed under greater privation, none has accomplished a movement of the magnitude of that which is today absorbing all of the time of the rail men.

We have had constructed, too, great electric railway and waterway facilities which are rendering a vital service to the communities which they touch and to the nation.

More recently we have developed a new service-highway transport, whose sturdy units, the truck and passenger car, may be seen today plying the highways of our country by the millions.

The task which confronts us is the coordination of these several agencies in the way which will render the greatest service to the public. Each has the field in which it can serve best. It would be folly to say that any one can do the job alone. It would be more than folly not to take advantage of the newer.

The ways in which the motor truck can best serve the railroads, and, through them, the public, are well summarized in the report of a special committee of the Chamber of Commerce of the United States headed by Alfred H. Swayne and containing in its membership some of the best known men in the railroad, electric, waterway, agricultural and motor fields.

Pointing out that cooperation rather than wasteful competition is essential, the report says that "the greatest opportunity for cooperation is at points where the capacity of the railroads is most limited and expansion is most difficult and costly; that is, in the terminal areas of our great cities." Among other conclusions are these:

Store-door delivery by motor truck, which would relieve congestion in these terminal areas and greatly increase the capacity of the freight stations, is undoubtedly the greatest contribution which can be made to the solution of the terminal problem.

Organized motor transport can also relieve the railroads of various forms of uneconomical service, such as trap car service, switching between local stations and short-haul shipments within the terminal area. This will reduce yard congestion and release many cars for more profitable line haul.

Expensive Terminals Needless

Putting it another way, the expensive terminal practice which was an integral part of rail operation in the days before the motor truck is no longer necessary. Instead of a highly concentrated movement into the heart of an industrial area of high valuation, the motor truck makes it possible for the railroads gradually to shift freight handling to the green lands where valuations are low. Instead of numerous way stations, an organized motor collection and delivery service will make possible a highly accelerated movement of goods from railroads direct to the consumer's door.

In horse-drawn vehicle days the addition of two or three miles to the highway was a vital haulage element. Miles are as nothing to the motor truck, which will not only handle the load more rapidly and expeditiously, but which, freed from the congestion of city streets which prevails at every freight station of any consequence today, will be able to save hours of overhead now lost in waiting and delays.

Remember the enormous outlays which face the railroads in the next ten years and then think of the saving in that capital expenditure which can be made through the release of freight cars for the long haul. This item alone will mean millions of dollars, and yet it is not all.

The public will be served more efficiently than is now possible.

Costly overhead in the form of freight terminals in congested areas will be eliminated or reduced.

Railroad operation will be concentrated upon the profitable part of the business, the haulage of commodities and persons for long distances.

The savings and additional earnings will not only make it unnecessary for the railroads to advance rates, but very probably the capacity of which is already being absorbed by local movements, will be eliminated.

The necessity to which the merchant is put today of carrying large inventories will be decreased, because the accelerated movement will make it possible for him to buy more frequently and thus take the benefit of turns in the market which inevitably will react to the interest of his customer.

Of course, such a turnover in present day practices as this connotes will not be accomplished overnight, nor will it be without its painful effects. No progress ever is.

For example, if the practice is to be made most effective, it should be centralized under a single control as much as possible, as freight trains will have to run to schedule and it will be necessary to clear loading platforms promptly and to load promptly in order to obviate the present delays which always react to the expense of the shipper.

Should Enter Cartage Business

The railroads should have the authority to and should enter the cartage business, as they are best situated to give the service of completed transportation, but it cannot be expected, nor would it be financially possible, for the railroads to give this service at present station to station rates. The cartage cost would have to be added, but this addition is already paid by the shipper and will be more than offset by saving in time, decrease in railroad fixed charges and other elements already considered.

The task now is largely an educational one. Completed transportation is a subject which strikes home to every business man, to every producer, reaching on to the community, the home and the individual.

What are *you* doing to meet the problems of transportation which are with you now but which will be multiplied a hundredfold in another decade?

Is there any field which should more engage *your* serious attention than this one which strikes to the very heart of your economic and special welfare?

Report Rouses Deep Interest

Presentation of the report on what has been done to promote coordination of transport was listened to with closest attention.

Much the same program was followed at the meeting of the Northern Central Division of the Chamber of Commerce, which was held Monday and Tuesday of this week at Chicago. At this, the second of the regional meetings, the discussion was opened by Alfred H. Swayne, vice-president of General Motors Corp. and chairman of the committee which reported on the relation of highways and motor transport to other transportation agencies.

Sweeping changes in railroad terminal practice which may force the transfer of freight sheds in large cities from congested business areas to "green lands" were forecast by Mr. Swayne. Making the emphatic declaration that the economic unrest of 1919 and 1920 was partly traceable to the breakdown in transportation due to massed movements at rail heads, he stressed the need for a coordination of all transportation agencies and said that plans are now under way to provide for an expedited, completed service from shipping platform to consumer's gate through the combined use of rail and waterways and organized motor trucking service.

"American railroads rank with the best in the world in line haul," he said, "but the unprecedented growth of tonnage movements in this country has placed a burden on the distribution system in the centers of population which already has brought us to a sharp need for the revision of past practice. Trap car deliveries, switching between local stations, and similar time-eating devices must be abolished, and a faster, cheaper and more economical truckage must replace the disorganized, individual handling which is today retarding our freight service and cluttering city streets with an unnecessary volume of slow-moving traffic."

Present Practices Archaic

Mr. Swayne called attention to the fact that present practices are in no sense due to railroad failure, but rather to economic limitations fastened upon the shipper in the days when horse cartage prevailed, when it was essential that the shipper have his factory at a railroad terminal or within a very few miles of one.

"The effect of this limitation," he explained, "was to simulate a terminal development in the center of productive activity. Naturally, locations of this sort become extremely costly as a city develops, and since rail facilities must keep pace with industrial expansion, the railroads have been gradually forced to an overhead investment which today is costing the shipping public hundreds of millions of dollars to maintain and which must inevitably cost similar sums in the future unless new methods are brought into play.

"Fortunately, the motor truck provides us with an answer to the problem, and, fortunately, too, the operation can be installed at a relatively small expense and without legislation. Nor is this a question of academic theory. Similar practices prevail now in England, and while conditions vary as between our two countries, the same basic principles control."

Makes Practical Suggestions

Mr. Swayne's suggestions, briefly put, call for a transfer of freight terminals from business centers to outlying lands (where the situation is extreme), with an organized motor service making collections and deliveries at stated intervals from and to shippers. In other cases, he pointed out the mere organization of the "collect and deliver" service, as it is known, will put an end to the incessant delays which today clog the whole transportation system.

"The shipper cannot expect that such a service will be as cheap as the present station-to-station rate," he said. "Delivery charges will still have to be added. The shipper is already paying the expense of cartage, but the overhead saving will be large and will exert a profound influence on all our methods of distribution and merchandising."

Citing large monthly savings made by his own company in handling freight direct by motor truck, Mr. Swayne called attention to the broad field of use of the motor truck which exists in a short-haul operation of varying lengths, dependent upon local conditions, and also asserted that the motor should abandon haulage of general freight for excessive distances.

Sound financial organization, as well as regulation of the motor vehicle, highway development and the utilization of modern mechanical equipment, were among the steps he said would be necessary to provide for the fullest economic use of the modern unit of highway transport.

Size, Weight and Speed Restrictions in State Motor Vehicle Laws

On Statute Books and in Force January 1, 1924

The legislatures of Georgia, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New York, Rhode Island, South Carolina and Virginia meet in regular sessions in 1924. Apart from any changes made by the law makers of these States or by the law makers of any States which may meet in special session, this material will reflect conditions as they will exist next year.

State	Size Restrictions	Weight Restrictions	Special Powers to Lower Weight Restrictions	Special Powers to Raise Weight Restrictions
Alabama	x	20,000 lbs. gross.	x	County Boards of Supervisors may issue written permits for operation of restricted vehicles.
Arizona	Width, 96 in. (Traction engines, 108 in.) Height, 12 ft. 6 in. Length, 30 ft.; combination of vehicles, 85 ft.	30,000 lbs. gross; 40,000 lbs. for vehicle equipped with 6 wheels having 3 axles at least 96 in. apart. On other than metal tires, weight must be distributed not more than 700 lbs. per inch (base) tire width. On metal tires 500 lbs.	x	x
Arkansas	Width, 96 in. Height, 12 ft. 6 in.	25,000 lbs. gross. Rear axle limit, ¾ of load; ½ axle load on one wheel. Trailer with 2 wheels shall be figured as carrying ¾ of load. A graduated scale of weight limits based on nominal tire widths is also prescribed.	Restrictions can be revised by proper officials in charge of highways.	Restrictions can be revised by proper officials in charge of highways.
California	Width, 96 in.; 102 in. maximum for common carriers on highways exceeding 15 ft. in width. Length of combination of vehicles, 60 ft.	24,000 lbs. gross, on 4 wheels; 34,000 lbs. gross, on 6 wheels; having 3 axles when 1st and 3rd axles are 96 inches apart, or on 8 wheels and 4 axles when 2nd and 3rd axles are 96 inches apart. Rubber tires, 700 lbs. per in. (base) width of tire. Metal tires, 500 lbs.	State Department of Engineering may reduce these limits in case of bridges, viaducts, etc. County Supervisors may prescribe lighter loads for county roads. 90 day limit unless highway is under construction. Aggrieved parties may appeal to State Highway Commission, which has ultimate authority.	Cities may increase width and load. Local bodies may raise weight restrictions. Department of Public Works may issue special permits allowing greater weights
Colorado	x	16,000 lbs. load on 4 wheels.	x	State Highway Department may issue written permits for heavier loads on State highways; Boards of County Commissioners for County highways.
Connecticut	Width, 102 in. Length of combination of vehicles, 40 ft.	25,000 lbs. gross, not less than 20 per cent. on one axle; 800 lbs. per in. (base) width of tire. Weight limits per wheel running from 500 lbs. for 3 in. tire to 6,500 lbs. for 10 in. tire, are also prescribed. *Thickness of Tire* 5 in. or less wide ... ⅞ in. thick 6 in. to 8 in. ... 1 in. thick Over 8 in. ... 1⅛ in. thick	State Highway Commissioner may restrict use of motor vehicles over 4 tons capacity on trunk lines or state aid highways.	On application in writing State Highway Commissioner or other authority having charge of the repair or maintenance of any highway or bridge may grant permits allowing operation of vehicles of more than restricted weight.
Delaware	Width, 96 in. (Traction engines, 108 in.) Height, 12 ft. 2 in.	22,000 lbs. gross. On one axle, 16,000 lbs. 700 lbs. per inch width of tire. (Point of measurement not fixed.) Equipped with metal tires, gross weight limit to 6,000 lbs. for state highways.	Highway Department may reduce weight limits 50 per cent when subgrade of state highways is in weak and unstable condition on account of weather or other conditions. The Levy Court of any county may, between Dec. 1 and May 1, reduce the limit to 600 lbs. per inch of tire tread between Dec. 1 and May 1.	State Highway Department may issue special permit to operate vehicles exceeding weight limits.
Florida	Width, 84 in. Height, 12 ft.	Outside Municipal Corporations; *Gross Wt.* — *Pneu. Tires* — *Solid Tires* Trucks ... 16,000 lbs. — 8,000 lbs. 4 wheel trailers ... 8,000 lbs. — 3,000 lbs. 2 wheel trailers ... 3,000 lbs. — 1,500 lbs.	Many counties by specific enactment are given power by the state to impose restrictions lower than those fixed in state law.	County Commission may grant permission to operate on designated highways restricted vehicles up to gross weight of 16,000 lbs.
Georgia	x	x	Cities and incorporated towns may regulate by ordinance.	Cities and incorporated towns may regulate by ordinance.
Idaho	x	No truck over 2 tons capacity shall operate on any but rubber tires. 500 lbs. per inch width of tires for tires over 2 in. width; under 2 in. in width, 350 lbs. Point of measurement, in pneumatic tires, between flanges of rim; on solid tires, the base. Minimum thickness of rubber tires, ¾ in.	Commission of Public Works may limit weights of loads when in their judgment the roads would be damaged by use of loads of maximum weight limits allowed.	Commission of Public Works may issue special permit to vehicles whose weight exceeds law specifications; County Commissioners and municipal authorities may do same.
Illinois	Width, 96 in. Length of combination of vehicles, 65 ft.	24,000 lbs. gross. On one axle, 16,000 lbs. 800 lbs. per inch width of tire. Point of measurement not fixed. Gross weight including weight of any trailer or semi-trailer, 32,000 lbs. Within cities of 20,000 or more population 50 per cent. greater limits allowed.	At seasons of year when frost is leaving ground highway officials having proper jurisdiction may prohibit operation of vehicles having gross weight of over 5,000 lbs. Embargo must not exceed 45 days in any one year.	Officials in charge of streets or highways may grant written permission for operation of trailer combination longer than 65 ft.
Indiana	x	24,000 lbs. gross. On one axle, 19,500 lbs. 800 lbs. per in. of inch width of tire, measured between flanges of the rim.	Highway Commission has power to prescribe maximum weights at certain seasons of the year in order to prevent injury to the highways. County Commissioners have same power to prevent injury to county highways.	Special permits may be issued by proper officials for operating of vehicles whose weight and load exceeds the limits prescribed by law.
Iowa	Width, 96 in.	28,000 lbs. gross. On one wheel, 8,000 lbs. *Per inch width of tire* 800 lbs. on hard surface road. 400 lbs. on earth, gravel and similar surfaces. Point of measurement of tire is at base. *Common carrier maximum weight* Pneumatics ... 20,000 gross Solids ... 16,000 gross	x	x

NOTE: In the following tabulations crosses (X) indicate that there are no state laws dealing with the subject. This does not mean, however, that counties, towns, and other political subdivisions of the state concerned are also without restrictions, or without the power to impose restrictions upon the size, weight and speed of the motor vehicles which may operate upon the highways within their jurisdiction. As a general rule, however, local ordinances contrary to the provisions of the state laws are forbidden or are unenforceable.

State	Size Restrictions	Weight Restrictions	Special Powers to Lower Weight Restrictions	Special Powers to Raise Weight Restrictions
Kansas	x	x	x	x
Kentucky	x	800 lbs. per inch width of rubber tire. 500 lbs. per inch width of metal tire. Point of measurement, surface contact. Dec. 15th to April 1st *Per in. tire width* / *Gr. Wt. on metal tire* / *Gr. Wt. on solid rubber tire* Less than 3 ..... 5,000 lbs. 5,500 lbs. 3 less than 4 ..... 5,800 lbs. 6,500 lbs. 4 less than 5 ..... 6,500 lbs. 7,500 lbs. 5 or more ..... 7,000 lbs. 10,000 lbs. On brick, concrete and similar heavy construction, a 50 per cent. greater load allowed.	x	County judges may issue permits for operation within limits of their counties of vehicles subject to the Dec. 15 to April 1 restriction.
Louisiana	Body width, 84 in.	15,000 lbs. gross on rear axle. No more than 10 per cent. in excess of rated capacity allowed. 600 lbs. per inch (base) width of rubber tires. 350 lbs. per inch (base) width of metal tires.	x	State Highway Commission may grant written permits for operation of wider or heavier vehicles. May also permit putting on of wider tires.
Maine	Width, 96 in. Height, 12 ft. 6 in.	18,000 lbs. gross on 4 wheels; (50 per cent more on 6 wheels) distributed not more than 13,500 lbs. per axle nor more than 700 lbs. per inch (base) width of tire, provided if weight distribution is not more than 600 lbs. per inch (base) width of tire, nor more than 16,000 lbs. per axle; gross weight may be 20,000 for 4 wheels.	Highway officials may exclude, restrict weight or equipment, or regulate speed of commercial vehicles on highways under their control, when, in their judgment the passage of any such vehicles over any highway or bridge would be unsafe or likely to cause damage.	State Highway Commission and local authorities may grant permission to operate restricted vehicles in special cases.
Maryland	Width, 90 in. (Traction engines, 100 in.)	20,000 lbs. gross. Vehicles with rated carrying capacity of more than 10,000 lbs. not registerable. 650 lbs. per inch width of tire. (Point of measurement not fixed.)	x	Highway officials may grant permission to operate heavier than restricted weights on highways subject to their control.
Massachusetts	Width, 96 in. Length, 28 ft. Length of combination of vehicles, 65 ft.	28,000 lbs. gross, 800 lbs. per inch width of tire. (Point of measurement not fixed.)	Highway authorities may lower gross weight limit to 20,000 lbs. when seasonal conditions justify reduction. State permission necessary on through routes. Authorities in control of bridges on earth, sand or gravel roads may limit gross loads on such bridges to 12,000 lbs.	Highway officials may grant permission to operate heavier or bigger units over the highways under their jurisdiction.
Michigan	Width, 96 in. Height, 12 ft. 6 in. Length, 40 ft. Length of combination of vehicles, 60 ft.	28,000 lbs. gross. On one axle, 18,000 lbs. 700 lbs. to each inch width of tire, measuring according to manufacturer's list.	Highway authorities may reduce limits of tire load one-half when highways are in soft condition.	Highway authorities may issue permits for operation of restricted vehicles over highways under their control.
Minnesota	Width, 96 in. (Traction engines, 108 in.) Height, 12 ft. 6 in. Length, 30 ft. Length of combination of vehicles, 85 ft.	28,000 lbs. gross. On one axle, 22,400 lbs. 800 lbs. per inch (base) width of tire.	x	Highway officials may issue permits for operation of restricted vehicles over highways under their control.
Mississippi	x	x	x	x
Missouri	Width, 108 in. Height, 15 ft. Length, 30 ft. Length of combination of vehicles, 85 ft.	28,000 lbs. gross on 4 wheels; 42,000 lbs. on 6 wheels. On one axle, 22,400 lbs. 800 lbs. per inch of tire width measured at base.	x	State Highway Commissioner and municipal street officials may issue permits for operation of restricted vehicles on highways and streets under their control.
Montana	x	x	x	x
Nebraska	Width, 90 in. Height, 12 ft.	On one wheel, 7,000 lbs.; 600 lbs. per inch of tire width. (Point of measurement not fixed.)	Local authorities have power to regulate the operation of motor vehicles within the limits of their municipalities.	Regulations noted have been promulgated by the State Department of Public Works. Local authorities have power to regulate the operation of motor vehicles within their municipalities.
Nevada	x	25,000 lbs. gross on 4 wheels; 30,000 lbs. on 6 wheels and 3 axles, no two of which are less than 96 inches apart. These restrictions do not apply to tractors. 600 lbs. per inch (base) width of tire.	x	x
New Hampshire	Width, 96 in. Length, 30 ft. Length of combination of vehicles, 85 ft.	20,000 lbs. gross on 4 wheels. On one axle, 15,000 lbs. Per inch (base) width of tire, 750 lbs.	Local authorities may regulate vehicles on particular roads or streets controlled by them, except as to speed.	State Highway Commissioners shall have power, from time to time, to fix, by written order, weight limits in excess of the limits herein prescribed, but not exceeding 28,000 lbs. gross weight over certain highways which in their opinion are so constructed as to be suitable for heavier traffic.
New Jersey	Width, 96 in. Height, 12 ft. 6 in. Length, 28 ft. Length of combination of vehicles, 85 ft.	30,000 lbs. gross. 800 lbs. per inch (base) width of tire. Specific limits are prescribed for various sizes of tires and wheel diameters.	Authorities in charge of bridges may post weight limits for such bridges and exclude vehicles whose weights are in excess of such posted limits.	Commissioner of Motor Vehicles may issue written permits for operation of restricted vehicles.
New Mexico	Width, 96 in.	12,000 lbs. load. Per inch width of tire, 700 lbs. (Point of measurement not fixed.)	The state, county or municipal authorities having control of any highway shall have authority to prohibit the use thereof or restrict the weight or character of motor vehicle traffic thereon when in their judgment, on account of wet weather, recent construction, necessity for repairs, or other conditions, such traffic would cause serious damage to such highways or to any bridge or structure thereon or to persons or property.	Authorities in control of highways may grant permits in writing to operate restricted vehicles.

State	Size Restrictions	Weight Restrictions	Special Powers to Lower Weight Restrictions	Special Powers to Raise Weight Restrictions
New York	Width, 96 in. (Outside of New York City.)	28,000 lbs. gross. On one axle, 5,600 lbs. when axles are more than 8 ft. apart. On one wheel, 9,800 lbs. 700 lbs. per inch of tire (base) width. (Outside of New York City.)	Highway commission may reduce limits on certain highways at certain periods of time to as low as 8,000 lbs. gross weight (Outside of New York City.)	Highway Commission may issue written permits for operation of restricted vehicles. (Outside of New York City.)
North Carolina	Width, 96 in.	11,000 lbs. capacity limit on State Highway System.	State Highway Commission may lower limits on state highways.	State Highway Commission may grant written permits to operate restricted vehicles.
North Dakota	..... x	..... x	..... x	..... x .....
Ohio	Width, 96 in. (Traction engines, 132 in.) Height, 12 ft. 6 in. Length, 30 ft. Length of combination of vehicles, 85 ft.	20,000 lbs. gross. On one axle, 16,000 lbs. Per inch width of tire, solid and pneumatic, 6 in. or over, 650 lbs.; measured between flanges of rim. The weight per inch decreases in proportion to the size of tires under 6 in. in width. Metal tires over 3 in. in width, a load of 800 lbs. per inch where total width of tires on all wheels exceeds 12 inches. Tires 5 in. or less in width must be at least ⅞ in. thick; over 5 in. through to 8 in. tires, 1 in. thick; over 8 in. tires, 1⅛ in. thick.	Highway commissioner or county authorities may reduce weight and speed limits for highways under their control.	Highway commissioners or county surveyor of any county and municipal authorities, upon application in writing by the owner or person having charge thereof, may grant permission for operating vehicles in excess of 10 tons weight.
Oklahoma	Width, 90 in. (Traction engines, 110 in.)	20,000 lbs. gross. On one axle, 16,000 lbs. Per inch width of tire, 800 lbs. (Point of measurement not given.) Minimum tire width on any vehicle, 3 in.; unless obtaining a written permit from Board or official having charge of highways.	If in the opinion of the Board or officer having charge of any public highway, the travel or moving thereon, at any season of the year of any vehicle or object which weighs more than 10,000 lbs. gross, would cause injury to said highway more serious than the ordinary wear and tear which the type of construction of such highway is designed to stand such board or officer may by regulation prohibit such vehicle from passing over such highway during such season.	..... x .....
Oregon	Width, 96 in.	Gross weight 22,000 lbs. distributed not more than 17,600 lbs. per axle nor more than 500 lbs. per inch (contact) width of tire for total of less than 30 in. on 4 wheels; 600 lbs. for total tire width of 30 or more inches on 4 wheels. If total concentrated weight on highway is 6,500 lbs. or less, tires must be at least 1 in. thick; over 6,500 to 11,000, 1¼ in.; over 11,000, 1½ in.	State Highway Commission and Board of County Commissions, or any County Court, may in their judgment reduce the size, weight and speed limits of vehicles on the highways under their jurisdictions.	State and County authorities may issue permits to operate restricted vehicles.
Pennsylvania	Width, 90 in. In cities of 1st, 2nd and 3rd class, width of 96 in. permitted. Height, 13 ft. Length, 30 ft. Length of combination of vehicles, 85 ft.	26,000 lbs. gross weight, distributed not more than 19,500 lbs. per axle nor more than 800 lbs. per inch (point of measurement not fixed) width of tire. Moreover, vehicles are classified (AA—F) and gross weight limits prescribed for each class. 7,000 lbs. for AA class to 26,000 lbs. for F class.	..... x	State Highway Commissioner may issue permits for operation of restricted vehicles.
Rhode Island	Width, 102 in. Height, 12 ft. 6 in. Length of combination of vehicles, 85 ft.	28,000 lbs. gross. On one axle, 10,000 lbs. metal tires; 22,400 lbs., rubber tires. On one wheel, 800 lbs. (rubber tires) per inch; 500 lbs. (metal tires) per inch. Point of measurement between the flanges of the rim.	Town and City Councils forbidden to regulate on State Highways and main highways leading from town to town but may on local thoroughfares.	Proper authorities may issue permits for operation of restricted vehicles on highways under their jurisdiction.
South Carolina	Width, 90 in.	8,000 lbs. capacity.	In York County 7,000 lbs. capacity is prescribed with a further limitation of less than 6,000 lbs. gross when highways are in soft condition.	Highway authorities with consent of State Highway Engineer may issue permits for operation of restricted vehicles.
South Dakota	..... x	10,000 lbs. capacity.	..... x	..... x .....
Tennessee	..... x	20,000 lbs. gross weight. 650 lbs. per inch (base) width of tire.	State Highway Department may make reasonable changes in regard to weight and general use of the highways under its jurisdiction.	State Highway Department acting in conjunction with County Highway Department may make such reasonable rules and regulations regarding weight, etc., and general use of the highway as they claim advisable.
Texas	Width, 90 in.	Not more than 6,000 lbs. gross weight on any one wheel, nor greater than 650 lbs. per inch of tire width. (Point of measurement not fixed.) Solid rubber tires must be at least 1 inch thick. No motor vehicle shall operate upon highways with a load 10 per cent in excess of its registered carrying capacity.	County road superintendents may reduce restrictions on bridges and on highways when they are in soft condition.	State Highway Commission may issue permits for operation of restricted vehicles.
Utah	Width, 96 in.	20,000 lbs. gross. On one wheel, 7,500 lbs. No license issued for trucks of more than 5 tons capacity except for use in cities of first class. 2,500 lbs. gross for vehicles with tires 2 inches or less; 3,500 for tires greater than 2 but less than three inches in width. Per inch width of tire, 600 lbs. on hard surface highways; 400 lbs. on sand or gravel, measured between flanges of the rim.	State highway officials may post bridges for lower restrictions. In addition, highway officials may restrict use of highways for a total of not more than 45 days in a year to limits as low as 5,000 lbs. gross weight.	State Highway Commission may issue permits for registration of vehicles of more than 10,000 lbs. capacity for exclusive use in cities of first class.
Vermont	Width, 96 in. Height, 12 ft. 2 in.	12,500 lbs. gross in towns and incorporated municipalities, 10,000 lbs. elsewhere. 600 lbs. per inch (contact) width of tire.	Highway Board may impose seasonal restriction below limits fixed in law.	Local authorities may issue permits for operation of restricted vehicles over highways subject to their control.

State	Size Restrictions	Weight Restrictions	Special Powers to Lower Weight Restrictions	Special Powers to Raise Weight Restrictions
Virginia	Width, 96 in. Height, 12 ft. 6 in. Length, 30 ft. Length of combination of vehicles, 60 ft.	Weight of load not to exceed 10,000 lbs. Per inch of tire width, 700 lbs. on class A roads; 600 lbs. on class B roads, and 500 lbs. on class C roads. Point of measurement, contact with road. Special permits must be obtained for trucks with metal tires.	The normal per inch width of tire limit for solids is 500 lbs. from May 1 to Dec. 1, and 400 lbs. from Dec 1 to May 1 each year.	Highway authorities may permit heavier loads over the highways under their respective jurisdictions.
Washington	Width, 96 in. Length of combination of vehicles, 85 ft., on no more than six axles.	24,000 lbs. gross. On one axle, 18,500 lbs. Per inch (base) width of tire, 625 lbs., metal; 800 lbs., rubber.	.....x.....	Highway officials may issue permits for operation of restricted vehicles over highways subject to their control, provided that load may not exceed capacity of vehicle.
West Virginia	Width, 90 in. (Traction engines, 108 in.) Height, 12 ft. Length, 40 ft. Length of combination of vehicles, 60 ft.	20,000 lbs. gross. On one axle, 17,000 lbs. 9,000 lbs. on any one wheel. 600 lbs. per inch width of tire (surface contact.)	.....x.....	Highway officials may issue, at their discretion, special permits in writing permitting the operation of vehicles whose size and weight exceeds the prescribed limits.
Wisconsin	Width, 96 in. Length, 30 ft. Length of combination of vehicles, 100 ft., with special permit.	24,000 lbs. gross on class A highway; 15,000 lbs. on class B highway. Distributed not more than 18,000 lbs. per axle, nor more than 800 lbs. per inch width of tire (point of measurement not fixed).	Executive officers in charge of maintenance may prohibit the moving of any load over any highway when weight is over 400 lbs. per inch of tire in contact with surface, at period of year when frost is coming out of ground and roads are in soft condition. Municipal authorities may reduce limits to not less than 7,000 lbs. gross in case of highways under their control.	The State Commission; County, State Road and Bridge Committees, may issue permits for operation of restricted vehicles on highways or bridges except those in municipalities. Municipal authorities may issue permits for operation of combination of vehicles not to exceed 100 ft. in length.
Wyoming	.....x.....	25,000 lbs. gross.	.....x.....	Highway Department may issue special permits for operation of restricted vehicles on highways under their jurisdiction.
Dist. of Col.	Width, 90 in.	30,000 lbs. gross on streets, roads and bridges; 12,000 lbs. on any bridge with wooden floor.	Commissioners have the power to change any of the regulations applying to motor vehicle traffic.	Engineer Commissioner may issue written permits for operation of heavier vehicles over bridges. Also may issue permits to operate vehicles heavier than 30,000 gross.

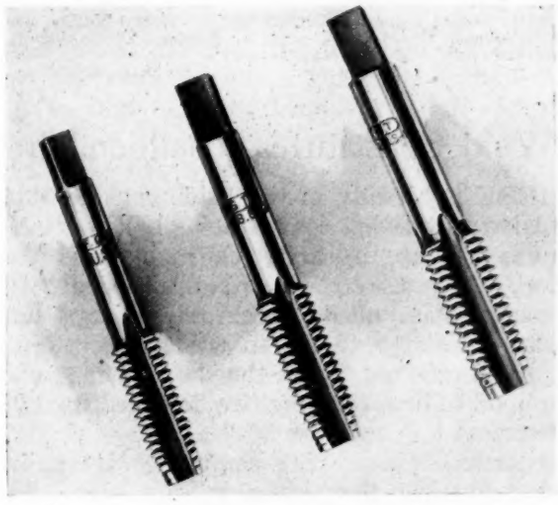
Flanders Ground Taps

HARDENING of machined parts usually produces distortion, and if the parts must be of a high degree of accuracy it is practically necessary that they be finished by grinding after hardening. The need for greater accuracy in the production of screw threads in machine work first was realized clearly during the war, and this led to the appointment of the National Screw Thread Commission, which has worked out tolerances on all of the elements of screw threads for different qualities of work. The problem now is to produce the threads so as to come within these tolerances.

Ralph Flanders of the Jones & Lamson Machine Co. has developed a machine for grinding taps, and Flanders ground taps are now being manufactured and sold by that company. It is claimed that taps which are ground after hardening not only are more accurate, but also that they give a bigger production. Grinding removes all of the imperfections due to the quenching, such as distortion of the teeth and bending of the tap as a whole.

The taps are made of high speed steel, and the reason for their increased production is said to be that in hardening they can be carried to the full hardening heat for this particular grade of steel, since fused points and edges are corrected in the grinding process. Besides, it is obvious that the cutting action is improved with increased accuracy of the taps.

It is claimed that pitch diameter tolerances of 0.0005 in. can be easily maintained, but owing to variations in measurements in different shops it is impractical to work to commercial tolerances of less than 0.0008 in. The lead error is held within plus and minus 0.0005 in. It is stated that with proper lubrication, alignment and cutting pressure, and in ordinary materials, the taps should produce holes within the limits on the "close fit" of the National Screw Thread Commission.



Flanders Ground Taps

AS an indication of the tendency to further specialization in engineering work it may be pointed out that in England there exists an Institution of Engineering Inspection. In a recent presidential address to the institution Francis R. Wade said that the institution had been correctly described as a horizontal intersection of all the vertical subdivisions of engineering work. One of the objects was to standardize the methods adopted by those whose duty it was to see that only really good work was sent out from the factories.

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What Constitutes a Balloon Tire?

THERE is already in the trade considerable confusion as to what constitutes a balloon tire. The term has been applied to a great many sizes from the 29 x 4½ in. and 30 x 5-in. six-ply "taxicab" tire, as it sometimes is called, which requires an inflation pressure of about 40 lb., to the 7.30 x 20-in. size, sometimes referred to as the 34 x 7 in., which is understood to be a four-ply tire designed for inflation pressures as low as 18 or 20 lb.

Executives of some tire companies are apprehensive already lest the public, having been told that balloon tires intended for inflation pressures as low as 18 lb. per square inch now are being used successfully, will jump to the conclusion that all tires called "balloons" by the automobile salesman are intended for use at low pressures and will proceed to use them at such pressures with disastrous results.

In some tire circles there is, on the other hand, a disposition to recommend, even with a "true" balloon tire, pressures of about 36 lb. per square inch, in spite of the fact that with this higher pressure much of the cushioning value of the balloon tire is lost and punctures are reported to be more frequent because of the higher unit pressure between tire and road.

Under existing circumstances it would appear that the Rubber Association should lose no time in formulating a table of approved inflation pressures which shall be marked clearly on the tire. Otherwise there is danger that the balloon tire will be overinflated or be confused with relatively high pressure tires which, through misuse at too low pressures, are apt to be rapidly destroyed.

If these incipient troubles are not nipped in the bud there is a possibility that they will bring a highly promising and commendable development into bad repute before the advantages which it is capable of giving under correct usage are realized.

Excise Taxes Prevent Price Cuts

FEDERAL taxation, in its numerous ramifications, will be the most important domestic question considered at the present session of Congress. It is unfortunate that the imminence of a Presidential campaign makes it improbable that so vital a subject will be viewed exclusively in its economic aspects. Unhappily a good many of our national legislators are more concerned at this time about political expediency than anything else.

A reduction in income taxes would be welcome to the men engaged in the manufacture and sale of automotive products, but a repeal of the obnoxious and discriminatory excise levy on motor vehicles and parts would be even more welcome. No justification save expediency can be found for this impost, especially at a time when the revenue of the Government exceeds its expenditures.

When this excise tax was applied as a wartime measure it was based on the theory that motor cars were a luxury in the same classification as silk shirts, cosmetics and jewels. This theory has long since been exploded, and it is universally conceded that motor vehicles, passenger cars as well as trucks, constitute an integral part of America's transportation system.

Representative Clancy of Michigan, who has introduced in the House a series of bills which would repeal these excise taxes, is soliciting the energetic support of the industry for his measures. He contends that there can be no further delay in impressing upon members of Congress that the makers, sellers and users of motor vehicles resent the discrimination against them in Federal taxation.

Virtually all automotive trade associations have taxation committees and they are now working out plans of campaign in connection with the excise taxes. The most powerful of these organizations believes that better results can be obtained by working separately rather than collectively. It is quite possible that the results of such an effort would be more effective, but whatever work is done must be immediate and vigorous.

The buyers of motor vehicles are the ones who pay the taxes, except where they are absorbed by overzealous dealers. It is quite logical, therefore, that the 15,000,000 motor vehicle users of the country ought to take the lead in registering their protests at Washington.

Even though manufacturers and dealers pass these taxes on to the public, elimination of them would have an instantaneous effect in broadening the market for their products. It would be possible to subtract the amount of the tax from the retail price and thus materially enlarge the number of potential buyers. Henry Ford has found that every time he clips a few dollars off the price of his car there is an immediate stimulation of sales. Repeal of the 5 per cent excise tax on passenger cars would permit a reduction of $50 on the price of an automobile now selling for $1,000.

The various trade associations have presented their arguments against the excise taxes to the House Ways and Means Committee, but the results will be negligible if the work stops here.

Dealer Losses on Used Cars

THE National Automobile Dealers' Association has compiled statistics which show that 449,520 used automobiles, with an average purchase price of $322.31, of a total of $153,820,000, were in the hands of automobile dealers on Dec. 15. This means an average investment of $3,845 each for some 40,000 dealers. The same authority estimates that the average selling price of used cars in 1923 was $308, and on the same basis the dealers who bought this merchandise at an average of $322 per unit will lose on it a little more than $6,293,000. While a loss of $155 per dealer may not be considered disastrous, the difference between the buying and selling price does not constitute the only loss on second-hand automobiles.

Carrying the compilation a little further, the N. A. D. A. has gathered figures showing that the dealers of the country sold 3,091,440 used cars from Jan. 1, 1923, to Dec. 1 of the same year, on which their losses were $57,347,000, or an average of about $1,433 per dealer. The figure does not include the cost of reconditioning, overhead, selling commission and advertising expense.

These computations of dealer losses, which may be accepted as fairly accurate, will give motor car manufacturers some concrete facts about one of the major problems of their retail selling organizations. They disclose, also, that the dealers of the country sold more than 6,700,000 new and used automobiles in 1923, or an average of nearly 170 apiece. There could be no finer tribute to their selling ability.

Why Some Service Men Go Crazy

PROBABLY there are quite a few permutations and combinations of nuts, cotter pins, lock washers, rivets and screws which have not yet been used in the numerous car and truck models built in this country during the past few years, but the average service man is inclined to doubt it.

One prominent make of six-cylinder passenger car uses 7 sizes of carriage bolts, 16 sizes of cotter pins, 5 sizes of Whitney keys, 12 sizes of lock washers, 27 sizes of nuts, 19 sizes of rivets, 98 sizes and types of machine screws and 57 sizes of wood screws in body work!

Very likely such a list doesn't worry a hardened purchasing agent whose clerical force is trained to handle a variety of details of this kind, but when it comes to the service station with no comparable organization the case is quite different. It must carry, not only the bulk of these sizes, but must have the taps, drills, dies, wrenches, etc., necessary to handle replacements and repair work in which such items play an important part.

It is easy to make a perfectly plausible excuse for such a variety, but there is, after all, no good reason why the variety cannot be reduced to one-half or perhaps to an average of one-fifth of the sizes now employed.

Other items, such as bushings, which vary in diameter by 1/64 or 1/32 in. and thus require an excessive number of reamers in the service station, continually arise to plague the service man, complicate his work and add to its cost.

Manufacturers well can afford, in the interest of better service alone, to study this matter of simplification. If they will appoint at least one competent engineer whose duty it will be to simplify designs and reduce to a minimum the number of sizes of small parts used, there is little doubt that the expense will be more than offset by direct as well as by indirect savings.

Fuel Vaporization Temperatures

JUDGING from statements made in several papers presented at the annual S. A. E. meeting, the impression still prevails that if a motor fuel has an end point of, say, 500 deg. Fahr., it is necessary to heat it to that temperature in order to completely vaporize it in a combustible mixture. As a matter of fact, it is not necessary to heat the fuel above atmospheric temperature to vaporize it, if unlimited time is available and if a free circulation of air can be maintained over it. In an engine the atomized fuel is mixed with many times its weight of air, and this has to a certain extent the same effect as a free circulation over a body of the fuel, greatly reducing the temperature required for vaporization under otherwise identical conditions.

It will be seen from the above that there are three factors which determine the temperature necessary for vaporization, namely, the end point of the fuel, the proportion of air to fuel in the mixture, and the time available for the vaporization, and it is entirely impossible to determine the necessary temperature from the end point alone. The temperature here referred to is that of the fuel itself and not necessarily that of the hot plate or hot spot with which it may be brought in contact. Undoubtedly the higher the temperature of the fuel the more rapidly it will vaporize, but as regards the hot plate, there is a certain critical temperature for which the rate of evaporation is a maximum. If the plate is heated beyond this temperature the fuel enters the spheroidal state; its rate of heat absorption from the plate is then reduced, and the rate of evaporation declines in consequence.

Tax Repeal Favored by 8 Committee Men

Only One of Them, However, Would Remove All Taxes Asked in Clancy Bills

WASHINGTON, Jan. 23.—The first move for favorable action on the Clancy measures, asking for the repeal of the excise taxes on automobiles, trucks, tires and accessories, was made today when the Democratic minority of the House Ways and Means Committee voted favorably to report out the measure.

The action was put in tangible form by the presenting of a resolution, submitted by Congressman William A. Oldfield, (Ark.) Democratic member of the committee, asking for a favorable report on two of the Clancy measures, the repeal of the 5 per cent so-called "nuisance or misfortune" tax on tires and parts, and the excise taxes on trucks and automobiles, valued at less than $1,000. Action on the resolution by the full Committee, it is expected, will be taken within the next ten days.

Poll Made of Members

What the committee's action will be may be forecast, it is predicted from the results of a poll made by a representative of AUTOMOTIVE INDUSTRIES, who asked for an expression of opinion on the excise repeal provisions.

Out of fourteen members of the twenty-six members of the committee, eight were favorably inclined. Of this eight, five were Democrats and three Republicans. Two members were of the emphatic belief that the excise taxes on automotive products should continue for the present, and four members refused to discuss the question.

Of the eight committee members, however, only one of them expressed an approval of the repeal of ALL the automotive excise taxes, the remaining seven being either for the repeal of one or both of the provisions covering trucks and accessories. Of the three measures it is believed that the one covering accessories has the best chance of relief.

Other Organizations Appear

Following the testimony of representatives of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association two days last week, representatives of the American Automobile Association, the Automobile Body Builders Association, the National Association of Taxicab Owners, the Rubber Association of America, and two members of Congress, including the author of the resolutions, Representative R. H. Clancy of Michigan, were heard by the committee.

The automobile owners' side of the issue was offered by Major Roy F. Britten of St. Louis, chairman of the legislative board of the A. A. A., who presented to the committee a petition containing 8000 signatures of motorists who visited the New York national automobile show, asking for the repeal of the 5 per cent excise on automobiles.

He outlined to the committee the various taxes with which motorists are now being burdened, citing (1) State registration fees; (2) city license fees; (3) driver's license; (4) personal property tax; (5) certificate of ownership; (6) State gasoline taxes.

Major Britten told the committee he recognized that taxes must be reduced,

(*Continued on page* 207)

Business in Brief

NEW YORK, Jan. 22—Weather conditions have affected both trade and industry. Retail trade has been stimulated in the North and West by the cold snap, while in the Southwest bad roads and rains have limited buying. In the East the mild weather has curtailed the buying of winter necessities, while in the West building has been slowed by cold weather, snow and rain.

Greater activity is reported in automobiles, iron and steel, with iron and ore prices higher and with a slightly increased production in crude oil announced. Gasoline has advanced.

Car loadings continue as an interesting barometer of the condition of business, the loadings for the week ending Jan. 5 totaling 703,269 cars, a gain of 87,835 over the previous week, although 64,027 under the like week of last year. The loadings are appreciably better than in the same period of both 1922 and 1921.

Bank clearings for the week ending Jan. 17 show an increase of 5.1 per cent over the preceding week, with $8,564,849,000 reported. The same week a year ago was 1.4 per cent under. Bank debits show a gain of seven-tenths of 1 per cent over the preceding week, but a loss of 2.1 per cent from the like week a year ago.

In eastern Kansas it is felt that the winter wheat crop has been damaged by extremely cold weather. Corn has been improved by low temperatures, but it is felt that in Illinois and part of Iowa it has been affected by high moisture content. Heavy marketing of live stock is reported, with more strength in prices but the quality of cattle poorer.

Stocks are active and irregular, with bonds generally strong, call money firmer and exchange unsettled.

Bassick-Alemite Co. Buys Evans Control

E. S. Evans Becomes Member of Board of Directors of Bassick Co.

DETROIT, Jan. 22—The Bassick-Alemite Co. has bought 51 per cent of the stock of E. S. Evans & Co., Inc., and E. S. Evans, president and general manager of the Evans company, becomes a director of the Bassick company, in a move which brings about a close union of the two companies, though each retains its separate corporate existence.

No purchase price is mentioned in connection with the transaction. The Evans company on Jan. 1 listed net assets of $1,600,000, and the profits of the company in 1923 were in excess of $300,000. Mr. Evans' investment in the company approximates $1,500,000.

E. W. Bassick becomes chairman of the board of the Evans company. Mr. Evans remains as president and general manager; J. G. Alexander of the Central Trust Co., Chicago, the financial connection of the Bassick company, becomes vice-president; E. H. Rogers, Detroit, secretary; T. M. Stevens, Chicago, treasurer, and E. M. Groover, Detroit, assistant treasurer. These officers comprise the directorate.

The motive behind the purchase of the Evans stock is said to be the desire of the Bassick company to bring E. S. Evans into its organization. Though not named to any position on the Bassick organization, Evans will be in position to assist in the management of the manufacturing and sales in the western plants of Bassick.

Coincident with its manufacturing of loading apparatus for the industry, the Evans company is starting work this week on a factory at Jackson, Miss., where it will manufacture floor boards, dash boards, body frames and other wood parts for automobile bodies. This plant will cost $100,000 and will have a capacity for about 1000 bodies daily.

The Bassick-Alemite Co., in addition to its manufacture of the Alemite system, is a large manufacturer of furniture and automobile body hardware.

Court Declines to Name Dorris Motor Receiver

ST. LOUIS, Jan. 21—Circuit Judge Frey has denied the application for a receivership for the Dorris Motor Car Co., asked for by Webster Colburn and E. J. Scott on the ground that it appeared unfair to appoint a receiver for a solvent company. The suit was directed against Frank C. Thompson, H. B. Krenning and Parker H. Woods, directors.

The petition charged that Mr. Krenning and the other defendants attempted to dissolve the company with advantage to themselves and to the detriment of the common stockholders.

Returns from Shows Warrant Big Output

Operations Are Increasing, with a Few of the Major Plants at Capacity

NEW YORK, Jan. 21.—A high volume of production is reported from automobile producing centers as evidenced by the maintenance of employment by many producers at practically the peak points of last spring. A few major manufacturers are on capacity schedules and others will swing nearer top-notch operations as February approaches and the show season progresses. By the beginning of next month, it is expected that the industry generally will be operating along lines that featured some of the best months last year.

Trade Stimulated in New York

Good reports are being received from sections of the country where shows have been held within the last few weeks and those from New York indicate that the show there has done much to stimulate buying in the metropolitan district. Manufacturers are basing their current operating schedules on these reports and are taking all precautions against a shortage of cars in the spring when buyers enter the market in greatest numbers.

The open weather has proved no inconsiderable factor in keeping up sales at an exceptionally high level for this season of the year, this affecting rural sales in particular. The feeling prevails that rural districts offer possibilities that warrant producers in looking toward those districts as one of the leading markets for automotive products and are preparing the way for aggressive sales campaign there this spring.

Other Branches Affected

The encouraging outlook presented for a year of good sales production is apparent in branches of the industry other than the passenger car. Greater interest is being manifested in the motor truck. Sales in industrial centers continue firm, and agricultural sections give signs of offering a readier truck market than heretofore. An impetus to sales is looked for from the good roads show recently held in Chicago.

Business of parts makers is keeping pace with the generally good conditions in the vehicle manufacturing field. Plants have completed their inventory taking period, which was shorter this winter than last, and are operating on high schedules. These schedules will be mounted gradually to meet the greater demand from customers.

In the tire-producing field, output is increasing, although the figure of a year ago has not been reached. It is estimated that in the Akron district, production aggregates 95,000 tires a day, which is an increase of 20,000 over two months ago.

Revival of Truck Interest Promises Parts Makers More Business in That Field Than for Some Years

AN INTERVIEW WITH WILLIAM C. LITTLE,

of the Bearings Co. of America,

By D. M. McDonald,

Detroit News Representative of the Class Journal Company

Detroit, Jan. 23.

REDUCTION in the number of car producing companies with its accompanying effect of concentrating the business in the hands of fewer companies, evidenced from year to year by the number of exhibitors at national shows, is to be expected, and from a parts maker's viewpoint contains nothing alarming, according to William C. Little of the Bearings Co. of America.

The automotive industry differs in no particular as regards its fundamentals of management from any other industry or business. Just as the failures and withdrawals from other business are reported all the time, so will there be failures and withdrawals in the automobile business, not that it is unsound, but only that the methods of management of the particular companies have not been capable.

Disappearance of the weak companies can only mean that the remaining companies have that much more opportunity to become stronger, said Mr. Little, because the demand for cars is constant and must be met by one company or another. Because a company is small does not necessarily imply that it is weak and there is no reason why small companies should not get their share of the business and grow larger if their methods are sound.

Speaking as a parts maker, Mr. Little said he was convinced there would always be a group of independent companies which would command a large share of business, so that any thought of absolute concentration of business was not to be seriously considered.

The experience car producing companies have had in the last few years with the operation of their own part manufacturing subsidiaries argues against any serious movement in this direction, said Mr. Little. Many of the parts plants taken over by large car companies following the war have since been sold, their operation being found uneconomic, so that it is quite unlikely that there will be any new development of this kind.

Car manufacturers now are taxing the capacity of their supply sources and there is every probability that this will continue through the year. Commitments, however, are confined to short and exact periods so that should there be less car demand than anticipated, manufacturers can quickly adjust their schedules to meet conditions. Inventories are so light, Mr. Little said, that manufacturers could dispose of them in short order through their service departments alone.

There is a noticeable revival in interest in the truck field, declared Mr. Little, and he expressed the belief that there would be more business in this field for the parts maker than there has been for several years. The trucks there were left over from the war period are now about all worn out and will have to be replaced in large numbers beginning from this time on. With general business good throughout the country trucks will be required in large number.

Mr. Little decried the tendency being evidenced in the industry to speak of good conditions for the first six months of the year only. This has been done successively for the last few years and there has grown up a feeling of surprise when business stayed good all the year round. The situation calls for expressions of confidence in good business throughout the year, declared Mr. Little, presidential election year as it is notwithstanding.

SAXON FINAL ACCOUNTING

DETROIT, Jan. 21—Trustees of the defunct Saxon Motor Car Corp. have filed their final accounting, showing $17,953 for distribution.

Stewart-Warner Earned $14.16 Share Last Year

CHICAGO, Jan. 21—Preceding the issuing of its annual report, the Stewart-Warner Speedometer Corp. has issued a statement which gives the net profits of the year ending Dec. 31, 1923, as $6,728,-119, which is equal to $14.16 a share on the 474,976 shares of no par value stock. In 1922 the net profits were $5,335,162, equal to $11.23 a share.

Accompanying this statement, was the announcement that the directors have declared the regular quarterly dividend of $2.50 a share, payable Feb. 15 to stockholders of record Jan. 31.

Durant Will Produce 500 Daily at Lansing

This Figure Expected to Be Reached in Sixty Days—Includes Mostly Stars

DETROIT, Jan. 23—The Durant plant in Lansing will be pushed to a daily production of 500 cars within the next sixty days, according to W. C. Durant, upon the occasion of his visit to the factory there. Within thirty days it is expected to bring production at the plant to the 400 daily mark, which will be made up almost entirely of Star models, with the remainder Durant fours.

Mr. Durant said the plans for the erection of a body factory adjoining the car plants have been abandoned because the factory is now assured of its body supply. The next six months, he declares, will be one of the heaviest in automobile production that the industry has known. General conditions warrant it, he said.

Mr. Durant plans to visit Chicago, Minneapolis, Omaha, Kansas City, St. Louis, Cincinnati and Cleveland. He is accompanied by W. C. Haller, manager of the Durant plants at Flint; T. D. Johnson, sales manager of the Flint Motor Co., F. W. Hohensee, vice-president and general manager of Durant Motors, Inc., W. J. Bailey, general traffic manager of Durant Motors, Inc., H. W. Alger, vice-president and general manager of Durant Motor Co. of Michigan; T. E. Jarrard, sales manager of the Durant Motor Co. of Michigan, and J. W. Appledorn, architect, New York.

New Company Will Make Stephens' Service Parts

MOLINE, ILL., Jan 24—The incorporation of the Stephens Motor Car Service Co. of Chicago and Freeport to deal in cars, trucks, tractors and farm machinery, will not take over stock or manufacturing facilities of the Stephens Motor Car Co., or take over the tractor works of the Moline Plow Co.

The new corporation has $50,000 capital stock which is held as follows: Standard Motor Parts Co., $49,700; Michael Tauber, Harold F. White, and Sam Levy, $100 each. All these stockholders are in Chicago.

George N. Peek, president of the Moline Plow Co., states that the new company will manufacture and supply service parts for Stephens automobiles and Moline Universal tractors.

"The manufacture of Stephens automobiles and Moline Universal tractors remains unaffected by the incorporation of the new company, in the Moline Plow Co., Inc.," Mr. Peek says.

NEW OVERLAND DIRECTORS

TOLEDO, Jan. 22—Joseph P. Cotton of Cotton & Franklin, attorneys, New York, and Harry C. Tillotson, president of the Tillotson Manufacturing Co., were elected directors of the Willys-Overland Co. at the regular monthly meeting of the board. Mr. Cotton was prominent in the Willys Corp. suit, and now is active in the plans for handling the common Overland stock given to preferred Willys Corp. stockholders through the Tracy plan of purchase.

AMBASSADORS TO HEAR MOTOR CONGRESS PLAN

NEW YORK, Jan. 21—John N. Willys, chairman of the Foreign Trade Committee of the National Automobile Chamber of Commerce, will meet the representatives of the various embassies at the Metropolitan Club in Washington next Monday afternoon, addressing them on the plan of the World Transport Convention which will be held in Detroit next May under N. A. C. C. auspices.

Mr. Willys will outline his plans and ask for the support of the diplomats in interesting their respective countries in the big congress.

Invitations to the foreign countries to participate will be sent out by Secretary of State Hughes, which will give the convention the official recognition desired by the industry.

Tuscora Rubber Assets Appraised at $204,000

AKRON, Jan. 22—Assets of the Tuscora Rubber Co. of New Philadelphia are placed at $204,000 in an appraisal made by a special committee headed by George Sherman of the Akron Salvage Co. The company was recently placed in the hands of Willis Bacon, Akron attorney, as bankruptcy trustee.

This figure is practically equal to the liabilities of the company and the creditors have hopes of receiving dollar for dollar for their claims if the plant sells at a fair figure.

Several bids for the plant have been received informally by the trustee, but a day for sale has not as yet been fixed. The company went into bankruptcy following a long struggle against financial difficulties. A new company motivated by civic pride attempted unsuccessfully to float new securities to save the plant for New Philadelphia.

WAYNE TANK FRENCH COMPANY

PARIS, Jan. 15 (*by mail.*)—Under the title Wayne Tank & Pump Co., an incorporated company has been formed under French laws, with offices in Paris, for the sale in France of the products of the Wayne Tank & Pump Co. of Fort Wayne, Ind. The capital of the company is 150,000 francs, and the directors are Roger N. Goode, William M. Griffin, Franklin Geyer, Carroll L. McDavitt, and Charles E. Franks.

Wigginton Directs Affairs of Roamer

Plans Being Made for Active Production Not Later Than First of February

KALAMAZOO, MICH., Jan. 22—The reorganization of the Roamer Motor Car Co. has been completed and plans are now under way to begin active production not later than Feb. 1.

The board of directors named includes: George P. Wigginton, Charles A. Blaney, Joseph E. Brown, E. V. Brigham, Charles G. Bard, A. C. Barley, Kalamazoo; W. S. Thomas, Grand Rapids and Dr. F. S. Bonine, Niles.

The officers are: President, George P. Wigginton; vice-president, Charles A. Blaney; second vice-president and general manager, I. F. Shaefer; third vice-president and assistant treasurer, Richard Armstrong; treasurer, Joseph E. Brown, and secretary, E. V. Brigham.

Mr. Shaefer comes to Kalamazoo from Indianapolis. He has been actively engaged in the reorganization and stabilizing of the Premier Motor Car Co. Mr. Armstrong for years has specialized in the rehabilitation of concerns temporarily in financial difficulties.

Messrs. Wigginton, Shaefer and Armstrong are now at work completing the reorganization of the production, sales and advertising end of the business. It is as yet too early to announce any changes that will be made, but several executives are now being considered for important positions in the concern.

Creditors Approve Plans

The re-financing is practically determined and will be officially announced in a few days. In this connection Mr. Armstrong reports that 92 per cent of the company's creditors have agreed to accept the new financing proposal, which will give them 20 per cent in cash and the balance in deferred notes dated two, three and four years hence.

In the meantime plans are being laid to begin operations at the plant by Feb. 1. All commitments are being dated on that basis. The concern will specialize on Pennant taxi-cabs, though the present stock of Roamer and Barley car material will be used up, thus cleaning up that portion of the inventory.

General Manager Shaefer expects to have the plant on a daily production of five cabs a day within 60 to 90 days. This will be increased as rapidly as possible.

RAY W. SHERMAN RESIGNS

NEW YORK, Jan. 22—Ray W. Sherman has resigned as business counsel of the Class Journal Co. He formerly was in charge of the merchandising department of the Automotive Equipment Association and prior to that was associated for nine years with Motor World and other Class Journal papers.

S. A. E. Acts to Help Bureau of Standards

Clarkson Writes to Congressman Tinkham Deploring Small Appropriation

NEW YORK, Jan. 21—Believing that the $15,000 which has been allowed the Automotive Powerplant Section of the Bureau of Standards is not sufficient to carry on the great work the bureau is doing for the automotive industry, Coker F. Clarkson, general manager of the Society of Automotive Engineers, has written Congressman Tinkham of the subcommittee of the Appropriations Committee of the House of Representatives, asking that the appropriation be substantially increased.

In addition to this, Mr. Clarkson has sent copies of his letter to members of the S. A. E. asking each in turn to write to his representative with the same object in view. It is expected that the combined efforts will cause Congress to appreciate the real good the bureau is doing the automobile industry in the way of research work.

$15,000 Counts for Little

Mr. Clarkson's letter follows:

In the pressure for economy in Washington, which is amply justified, the Department of Commerce has suffered in its appropriations and the Automotive Powerplant Section of the Bureau of Standards has been allowed so little in budget as to be almost certainly wiped out.

The $15,000 that has been allowed for the work of the section will, we understand, be taken up by the effect of the Reclassification Act.

One hundred thousand dollars ($100,000) would probably easily carry the section and mean more to it than appropriations it has received in the past. This sum would be a mere drop in the bucket compared with what the section has done and stands ready to do for industry and the public.

The Automotive Powerplant Section of the Bureau of Standards has done work of the greatest value in connection with the design and operation of motor vehicles. It has made studies of various features of engines and conducted fuel investigations of fundamental and nation-wide importance.

Acted as Neutral Investigator

It has been of the greatest value to the public as well as to the automobile and the oil industries for this department of the Bureau of Standards to conduct fuel and other investigations, for the reason that to secure adequate results promptly it is necessary that such work be conducted by a non-partisan neutral organization whose test results will be readily accepted by all parties interested.

The Automotive Section has a unique equipment of mechanical and testing apparatus and an unusually able staff of trained engineers whose services the Government should not lose.

Specific items of work that have been handled by the section are:

Altitude chamber tests of aeronautical engine; resulting in improved aeronautical engines and assisting materially in the design of Liberty engine.

Dynamometer and road tests of automobiles under service conditions; resulting in general improvement of motor vehicles.

Gasoline investigation, assisted by the automobile and the petroleum industries, to determine the effect of using fuels of lower volatility in present automobile engines.

Lubricating oils.

Automobile brakes, with relation to traffic control.

Brake linings, to increase reliability and length of life.

The Automobile Powerplant Section is of great benefit to the Army, the Navy and other arms of the Government, and also to the public directly and through such organizations as ours.

We bespeak your thorough consideration of the facts surrounding the item of the appropriation bill referred to, and urge that the Automotive Powerplant Section be allowed at least enough of an appropriation to maintain itself for the purpose of securing for industry and the public benefits outlined above.

We wish to indorse the work of the section wholeheartedly and unqualifiedly.

BALLOON TIRE OUTPUT REACHES 3500 DAILY

AKRON, Jan. 22—Production of balloon tires in the United States has reached a total of not less than 3500 a day the best informed balloon tire experts in Akron say. This total has been reached in less than a year after the first unofficial announcements regarding the new tire were made.

The greater number of these tires are made in the rubber center, although several small companies in the East and in Chicago have specialized in certain sizes of the new tires and are making a large number of these casings.

More than half of the present production, it is estimated, is for replacement on cars using Ford size equipment.

Firestone Tire & Rubber Co. is the largest producer of the new tire in the Akron district.

Collier and Associates Buy Aeromarine Airways

NEW YORK, Jan. 21—Barron G. Collier and associates have purchased a controlling interest in the Aeromarine Airways Corp. The old organization has been dissolved and a new one formed, known as the Aeromarine Airways Corp. of New Jersey, with offices at 220 West Forty-second Street.

W. A. Buckner, who is secretary of many of the corporations in which Mr. Collier is interested, will also be secretary of the Aeromarine, while Charles F. Redden will continue as president.

Federal Drop Forge Reports Banner Year

Expects a Better One in 1924—Company Shown in Good Financial Shape

DETROIT, Jan. 24—Federal Drop Forge Co. of Lansing enjoyed its most successful year in 1923, according to reports shown at the annual meeting this week. The company is in the best financial condition that it has known, M. R. Carrier, president and general manager, states, and opens the new year with brighter prospects than ever before.

There is enough work on hand, according to the president's report, to insure 100 per cent capacity operation for the first six months of the year. Contracts from one car maker for one forging will keep two one-ton hammers busy during this period.

During the year the company has constructed a new heat treatment department building which is now being equipped with latest type furnaces. One furnace is of self-loading type. A die-engraving machine and one 2000 lb. board hammer have been installed and another similar hammer has been bought. There has been installed also an electric truck and travelling crane for rapid handling of stocks.

Financial Statement

The annual statement shows surplus increase from $32,000 last fiscal year to $58,939. Quick assets are $57,232 and current liabilities about $14,000. Inventory totals $108,181 which includes $85,769 in steel and die blocks, with steel figured at 2½ cents a pound. Total capital assets are $289,508 and outstanding stock is $371,815.

All directors were re-elected, comprising C. E. Bement, H. B. Lundberg, J. P. Hopkins, B. S. Gier, H. F. Harper, H. C. Teel and M. H. Carrier. Officers are M. H. Carrier, president and general manager; C. E. Bement, vice-president, and J. P. Hopkins, secretary-treasurer.

Marlin-Rockwell Steel Plant at Braeburn Sold

NEW YORK, Jan. 22—The Braeburn, Pa., plant of the Marlin-Rockwell Corp., which has an output of 100 tons of high grade steel daily, has been sold, and it is understood that the cash received will be used for further liquidation of bank loans. This was one of the plants built during the war and for the last three years it has not been operated.

This sale leaves the Marlin-Rockwell Corp. free to devote its full attention to the manufacture of ball bearings. It is reported that the company, after showing a deficit of $500,000 in 1923, now is more prosperous, January operations promising to yield the first profit in two years.

Empowers Receivers to Operate National

Company Consents to Receivership—Clarence A. Earl Resigns as President

CINCINNATI, Jan. 23—Rolland A. Crandall, financier, Chicago, and H. J. Linkert, Dayton, were appointed by the United States District Court as receivers for the National Motors Corp. under bond of $50,000. They are authorized to continue the business.

The action was taken on a suit filed by the Union Trust Co., Cincinnati, and H. A. Wheeler, Chicago, as trustees under a trust deed given by the corporation to secure payment of principal and interest on bonds issued by it on July 1, 1922.

They asked for foreclosure of a mortgage for $3,000,000 given as security for the payments and allege that the corporation defaulted payment of interest due July 1, 1922, and Jan. 1, 1924, and of a mortgage of $500,000 due July 1, 1923.

Plants of the corporation are located in Dayton, Indianapolis, Louisville, St. Louis, Boston, Lockport, New York, Saginaw and Jackson, Mich. The properties are said to be worth $10,000,000.

The defendants consented to the appointment of the receivers.

Executives Resign

CHICAGO, Jan. 21—Clarence A. Earl, president; Walter M. Anthony, vice-president and Walter J. Mery, secretary, have resigned from the National Motors Corp. and National Motors, Inc., which were to manufacture the National six.

Mr. Earl explained that the resignations were presented after months of endeavor on the part of himself and associates to get the interested parties to cooperate in putting the corporation on a sound basis. When first solicited to accept the presidency, Mr. Earl said, it had been stated to him by a New York financial house that a $3,000,000 bond issue had been sold and that the finances of the corporation were then in a position to permit it to go ahead with organization plans.

It developed, he added, that the bonds had not been sold and he asserted that the facts had been misrepresented. The "Earl Plan" followed, the success of which depended upon the complete cooperation of all interests involved. Largely through his personal influence, Mr. Earl stated, practically all of the bank and merchandise creditors approved this part of the plan, but despite their efforts, Mr. Earl and his associates found it impossible to secure the necessary cooperation.

The corporation started out as the Associated Motor Industries, Inc., in June, 1922. It was a Delaware corporation organized for $80,000,000 and included in the merger the National Motor Car & Vehicle Corp., Indianapolis, maker of National cars; the Covert Gear Co., Lockport, N. Y., transmissions, clutches, etc.; Recording & Computing Machines Co., Dayton, Ohio, ignition systems, starters, magnetos and other electrical equipment; Jackson Motors Corp., Jackson, Mich., Jackson cars and trucks; Kentucky Wagon Manufacturing Co., Louisville, Ky., Dixie Flyer cars and trucks, wagons, wheels and bodies; Saginaw Sheet Metal Works, Saginaw, Mich., sheet metal parts for cars and trucks; Traffic Motor Truck Corp., St. Louis, Traffic trucks; Murray-Tregurtha Corp., Boston, gasoline engines, and the H. F. Holbrook Co., New York, manufacturer of bodies.

Will I. Ohmer, president of the Recording & Computing Machines Co., was most prominent in the formation of the corporation which brought together companies whose assets were said to total $20,000,000. Mr. Ohmer was made chairman of the board, with Louis Ruthenberg, formerly general manager of the Delco Light plant, as president.

A year ago it was decided to abandon the name of Associated Motors in favor of the National Motors Corp., and it was announced that a National six at $795 would be produced and the Jackson and Dixie Flyer discontinued. Models of the low-priced six were displayed in the Commodore Hotel during the 1923 New York show, but the car never got into production.

Last March radical action was taken in selecting a new executive personnel, Mr. Earl, formerly of Earl Motors, accepting the presidency.

USED CARS SHOWED WIDE PRICE RANGE

ST. LOUIS, Jan. 21—Selling prices for used cars in the last quarter of 1923 had a wide range from the average of $202.16 in Iowa to $778.06 in Ohio, according to figures compiled by the National Automobile Dealers Association.

Wisconsin averaged $273.86; Missouri, $296.77; Oregon, $301.46; Mississippi and Louisiana, $301.43; Pennsylvania, $411.25; Illinois, $289.05; Kentucky, $273.86; New York, $467.96; Minnesota, $277.65; Michigan, $327.46; Arkansas and Tennessee, $266.93; Indiana, $255.71, and California, $412.75.

New York Rickenbacker Stages Owners' Contest

NEW YORK, Jan. 22—A unique contest to promote sales through the cooperation of owners has just ended. The contest was promoted by the Hunt Motor Car Co., metropolitan distributor of the Rickenbacker, which offered a Rickenbacker sedan as a prize to go to the Rickenbacker owner who would submit the largest list of prospects that resulted in actual sales.

Electric Auto-Lite Earns $10.07 Share

Net Income of $2,517,800 Is Reported for Year That Ended December 31

TOLEDO, Jan. 22—Declaring a quarterly dividend of $1.50, payable April 1 to stock of record March 14, the Electric Auto-Lite Co. reports for the year ended Dec. 31, 1923, a net income of $2,517,800, after charges and Federal taxes, equivalent to $10.07 a share earned on the outstanding 250,000 shares of no par capital stock.

This compares with $2,617,046, or $10.46 a share in 1922. Gross sales amounted to $14,523,616 compared with $12,331.795; net sales, before taxes, $2,960,886 compared with $3,205,774, while Federal taxes amounted to $321,610 as against $373,864.

The company's balance sheet as of Dec. 31, is as follows:

ASSETS—Plants and property, $4,145,714; investments, $649,000; cash and securities, $200,435; accounts and notes receivable, $1,027,065; inventories, $2,217,571 and deferred charges, $202,837.

LIABILITIES—Common stock, represented by 250,000 shares, $6,482,324; funded debt, $1,210,500; miscellaneous reserves, $345,419; accounts payable, $333,498; accrued wages, taxes, etc., $64,135, and unclaimed wages, $6,746.

Refunding Plan of Maxwell Indicates Big Operations

DETROIT, Jan. 23—Announcement by the Maxwell Motor Corp. of its plans for refunding its notes due June 1, next, indicates the company is planning more extensive operations of its several properties for which it will require additional working capital. The favorable reception of the Chrysler car and the resulting demand, which has exceeded the expectations of the company, are largely responsible for this.

The original plans for refunding the maturing notes were abandoned at the time the Studebaker negotiations developed, and subsequently it was decided that the company, under the plan of operations then contemplated, would be in a position to pay off these notes from current earnings.

The new plan for refunding, therefore, indicates a basis of operation considerably in excess of the earlier estimates and for which additional capital is necessary.

OUTPUT FOR DECEMBER

WASHINGTON, Jan. 24—The Department of Commerce announces December automobile production as 275,268 passenger cars and 27,875 trucks, a total of 303,143 for the month. This is in excess of the estimate of 296,595, made by the National Automobile Chamber of Commerce, and brings the count for 1923 up to 4,012,869.

Hydrogen Gas Urged for Flight to Pole

Upson Tells S. A. E. Aeronautical Session Its Advantage Over Helium

DETROIT, Jan. 23—Hydrogen gas would be more suitable than helium for use in the Shenandoah in its flight to the North Pole, Ralph Upson, aeronautical engineer, told the aeronautical session of the Society of Automotive Engineers at the annual meeting of the society, which opened here yesterday.

When all factors are considered, Mr. Upson said, hydrogen will give the ship a cruising radius on a flight of this kind twice as large as if helium were used. While the fire hazard is reduced very materially by the use of helium, Mr. Upson pointed out, its lifting capacity is considerably less than that of hydrogen. Consequently, with hydrogen in the bag, it would be possible to carry a far larger amount of fuel. It is possible, moreover, to burn some of the hydrogen itself as fuel if necessary. Thus the cruising radius would be materially enlarged.

Less Fire Hazard

The danger of fire, Mr. Upson believes, is far less than other hazards on the proposed trip to the pole. Consequently he thinks that the use of helium, while lowering the fire hazard, would increase risks from other sources by limiting the cruising range of the ship.

Hans Fokker, prominent aviation expert, told the engineers that lack of landing fields is the chief hindrance to commercial aviation in the United States. He predicted that there will be one airplane to every one thousand persons in this country at some future date and paid high tribute to the achievement of the air mail service.

The aeronautical session, which opened the S. A. E. annual meeting, held this year in Detroit for the first time, was attended by nearly 3000 engineers, the largest group ever assembled at any aeronautical session held by the society.

G. J. Mead, chief engineer, Wright Aeronautical Corp.; A. J. Lyon and Samuel Daniels were other speakers at this session.

Proposed Standards Approved

The Standards Committee meeting, held just before the opening of the regular sessions, resulted in approval, practically without discussion, of the standards proposed by the various divisions of the committee. Standards on sizes of tires in common use were adopted after slight revision.

The recommendation that the balloon tire standards recently adopted by the Rubber Association of America be approved by the S. A. E. and printed as information, but not as recognized standards, was presented by J. G. Vincent, chairman of the tire and rim division. No comments were made on the report except by Mr. Vincent, who said that a good deal still remains to be learned about balloon tires and that there should be closer cooperation in the future between tire and car engineers. The recommendations, given in detail in a previous issue of AUTOMOTIVE INDUSTRIES, were approved as read.

Brig.-Gen. C. L. H. Ruggles outlined plans for coordination of the automotive industry with Government forces for national defense in time of emergency at a business meeting held Tuesday evening. Brig.-Gen. J. W. Joyes presented motion pictures showing recent developments in ordnance.

The financial report of the society showed a net increase of $32,298 over the same period last year. Membership slipped off slightly, however, during the same period, the 1922 total having been 5114 as against 5053 at the end of 1923. Reorganization of sections is under way and a committee, headed by former President B. B. Bachman, has been intrusted with the task of finding the most practicable plan for future operations.

The brake session of Wednesday afternoon was featured by Henri Perrot's discussion of four-wheel brakes. After presenting a comprehensive description of his own experience and developments, he discussed brakes with representatives of leading American manufacturers.

He stated that American engineers have been slow to grasp the full possibilities of four-wheel brakes, but may be commended for their conservatism when all commercial angles are considered. Further, Mr. Perrot stated, the big brake problem confronting the industry is not four-wheel brakes themselves but improvement of steering gears and spring suspension.

Speaks of Instrument Development

Mr. Perrot was enthusiastic over the latest instrument development of the Bureau of Standards, which permits analysis of braking and skidding characteristics while the proposed car is still on paper. This instrument was described by W. S. James of the Bureau of Standards in his paper, "Brake Performance Studies."

A late development which produces equalization of braking forces rather than the equalization of brake rod pulling was described in a paper, "Theory and Practical Advantage of Balanced Brake Forces," by G. L. Smith.

Engineering interest in the brake situation is as keen as ever, as indicated by an attendance of more than 500 engineers at the session, which was presided over by W. B. Strickland of the Cadillac Motor Co.

AKRON TO BE MOTORIZED

NEW YORK, Jan. 24—A syndicate headed by Don Bryet of New York is reported to have offered to furnish motor bus service to Akron, Ohio, after Feb. 1. On that date the street railway franchise of the Northern Ohio Traction & Light Co. expires.

Pullman Steel Body to Appear at Salon

Will Be Shown on Packard Chassis—Weighs Fifty Pounds Less Than Usual Type

CHICAGO, Jan. 23—Announcement is made by the Pullman Co. that it will exhibit for the first time at the Automobile Salon, which opens at the Drake Hotel Saturday, an automobile body with steel frame. This will be shown on a Packard chassis, and it is said that the steel body is fifty pounds lighter than the ordinary automobile closed body.

Among the advantages claimed for the Pullman steel body are freedom from warping, squeaking and loosening of joints, greater strength and rigidity without increase in weight, safety and economy in production.

The body is made in sectional assembly units which are joined together by bolts with lock washers. Fabric saturated with paint is placed in the joints. The cowl and windshield frame are welded together in one unit, which is slid over the front end of the bottom frame in assembling, and supported thereon. The front posts of the side frames are joined to the corner posts telescopically, while the box-shaped top plate is provided with a ridge to receive the overlapping roof.

A box-shaped top plate and "U" shaped sill or shoe are used for the sides, into which posts are fitted and held by "U" brace plates. The front post is made to fit into the corner post of the front section door openings with hinge lugs. The rear unit connects the two side framing members by means of a flanged and bolted joint, concealed on the outside by a molding which is clamped tight before the bolts are fitted.

At the top is a ridge to receive the overlapping roof; at the bottom there is a flange for fastening the bottom frame. The side doors also have a steel frame, all parts being assembled and welded together in jigs.

Franklin Net Earnings Amounted to $1,140,000

SYRACUSE, N. Y., Jan. 24—The annual meeting of the H. H. Franklin Manufacturing Co. resulted in the reelection of H. H. Franklin as president, John Wilkinson as vice-president and F. A. Barton as secretary and treasurer.

The annual report shows 1923 to have been the second best year in the company's history, with net earnings of $1,140,000.

The balance available for common dividends amounted to $675,000, equal to $2.25 a share on the 300,000 shares of common outstanding, but the directors voted against payment of common dividends at this time, although declaring the regular quarterly dividend of $1.75 a share on the preferred.

Ford Output Totaled 2,200,682 Last Year

Of This Number, 1,915,485 Ford Cars and Trucks Were Produced in U. S.

DETROIT, Jan. 23—Total number of units produced by the Ford Motor Co. in all its division during 1923 was 2,200,682, of which 1,915,485 were Ford cars and trucks made in the United States; 95,640 cars and trucks in all foreign plants except Canada; 79,834 cars and trucks in Canada; 7,825 Lincoln cars, and 101,898 tractors. Tractors and Lincoln cars are made exclusively in the United States.

Ford closed cars produced in the United States during the year totaled 532,823 or between 27 and 28 per cent. Closed car production throughout the world and including the United States was 554,127. Closed car output during the year was mostly in the coupé and four-door sedan models, the new two-door sedan getting into production only in the latter part of the year. In 1924 closed cars are expected to approximate 35 to 40 per cent of the total.

Production of Ford cars and trucks in the United States increased 683,276. In all export countries aside from Canada and the Canadian export territory the total increased 26,782. Canadian and Canadian export increased 29,578. Lincoln production increased 2447 during the year and tractor output mounted from 68,985 to 101,898.

Weidely Sale Approved; Will Resume Operations

INDIANAPOLIS, Jan. 21—Judge Harry L. Chamberlin of the Circuit Court here has approved the receivers' sale of the Weidely Motors Co. assets to Edward W. Showers and W. A. Humphrey, treasurer and general manager of the company, and the majority bondholders, for a purchase price, including obligations assumed, etc., of approximately $300,000.

Mr. Humphrey announces that the concern will resume operations in about two weeks, and that a reorganized company will be formed with new officers. George A. Weidely will continue with the new company, it is understood.

The trouble that threw the company into receivership last August was brought about when automobile makers having contracts for Weidely engines stopped shipments suddenly. It is understood that new contracts for a considerable number of automobile and tractor engines can be obtained at once.

SETS ZWEBELL CLAIMS DATE

MILWAUKEE, Jan. 21—All creditors of the Zwebell Bros. Co., manufacturer of vulcanizing outfits and tire repair equipment, have been notified to file claims prior to June 5 by Otto H. Wadewitz, receiver. The Zwebell company, with plant and offices in Schleisingerville, Wis., was placed in the hands of a receiver a short time ago upon the application of the Crucible Steel Casting Co. of Milwaukee.

SMITHSONIAN TO GET SCENES OF INDUSTRY

CHICAGO, Jan. 21—Scenes from a number of automotive pictures will be included in the collection which Watterson R. Rothacker is preparing to present to the Smithsonian Institute for preservation to posterity. These scenes will be taken from movies which the Rothacker Film Co. has made in the past, visualizing various phases of the industry.

Studebaker, Continental Motors, Buick, Cadillac, Mitchell and U. S. Truck are some of the plants represented. The scenes will be selected with a view to giving people centuries hence a comprehensive picture of the automotive industry early in the twentieth century.

Rub-Tex Puts Earnings Last Year at $94,828

INDIANAPOLIS, Jan. 23—Rub-Tex Products, Inc., of this city, at its annual meeting, reported earnings of $94,828 for 1923. The officers announced that the board of directors had passed a resolution to pay on Feb. 15 all accumulated dividends on preferred stock of record Feb. 1.

The sale of the company's products for 1923 was reported to be more than double the 1922 output. A 24-hour schedule was maintained throughout the year. A short time ago the company leased a second plant, and is now contemplating another addition to the local factory.

Daily production of upward of 400 battery boxes is planned when the proposed expansion is completed, which is expected to be by March 1.

Hohman-Nelson Business Sold and Will Be Moved

EAU CLAIRE, WIS., Jan. 21—The Hohman-Nelson Co., manufacturer of recording and controlling instruments, gages, valves and steam specialties, has disposed of its entire business to the American Schaeffer & Budenberg Corp., Brooklyn, N. Y. The operation is now being transferred to Brooklyn.

The Eau Claire concern retains the machinery and other factory equipment, which it will dispose of privately, but the sale includes all patents, good will, merchandise and materials on hand. A. J. Nelson, president of the Eau Claire company, and L. S. Lyons, sales director and advertising manager, become associated with the Brooklyn company.

The Hohman-Nelson Co. was established four and a half years ago.

Ford Is Encouraging Delivery This Month

Spring Orders Call for 360,000 Cars, 200,000 Booked Under Weekly Plan

DETROIT, Jan. 23—Ford Motor Co. reports that its dealers have booked for February and spring delivery, 360,000 orders, representing 200,000 booked under the weekly payment plan, and 160,000 under the regular payment plans. Because of this already oversold condition the factory is making a special effort through its advertising to encourage delivery this month and next.

In spite of the 10,000 daily production that the company will enter upon early in the spring it fears that it will not be able to meet the demand that is promised with the appearance of the accustomed buying season. Stocks now in dealers' hands are fairly heavy and will be increased as much as present production facilities make possible, but it will be impossible in the face of present steady buying, the sales department declares, to get enough cars together to meet demand if it comes all at one time.

Sales Lost Last Year

In 1923 the Ford company lost 350,000 sales because of oversold conditions at the peak season and every effort will be made to prevent a repetition of this condition. This is business that the company would have had if buying had been distributed over a greater period, the sales office declares, and is urging its dealers for their own welfare and for the greater satisfaction of prospective owners, to eliminate delays in deliveries and possible cancellations through special sales activity now.

The setting up of facilities that will give the company a production of 10,000 cars and trucks daily will about plumb the depths of the low priced car market as it now exists, the company believes. If it is found that this production is not sufficient it will be increased, the company's plans being already set to step it up if necessary, but it is believed that 10,000 daily will meet all business offered for the present.

To Avoid Oversold Condition

Production plans throughout the industry reflect the attitude that no business will be lost through oversold conditions if it can possibly be avoided. All of the large producing companies have made important increases in their production facilities and little business if any will be lost through prospective buyers being obliged to wait for deliveries.

It is generally conceded that all the production possibilities of all factories may not be required, but nevertheless the production will be there as it is needed. There is no disposition to overflow the market but on the other hand there is the determination to meet all the business that can be obtained.

Parts Sales Gained 49 Per Cent in 1923

Total Business Done by M. A. M. A. Members Last Year Amounted to $625,274,950

NEW YORK, Jan. 21—Sales of parts, valued at $43,289,950, made by members of the Motor and Accessory Manufacturers Association in December bring the grand total sales of the association's members to $625,274,950 for the full year of 1923. This is an increase of 49 per cent over 1922, when sales amounted to $419,722,880. Increase of the business of the parts concerns is in keeping with the 50 per cent increase in production by the automobile manufacturers.

Not alone has business itself been better, but reports received from members show that the automobile industry is meeting its obligations most promptly and that from a financial viewpoint, 1923 was a much better year than its predecessor. Whereas past due notes in 1922 totaled $42,652,650 in 1923 they were cut 29 per cent, amounting to only $30,284,500.

Notes outstanding, too, kept pace with this and the summing up for the year shows that there has been a 45 per cent decrease here, the total for 1923 amounting to only $16,960,650 in comparison with $30,904,000 in 1922.

December's business was not so good as November's by 17 per cent; in fact, December was the poorest month of the year, but at that it was as good as the best in all of 1922.

Collections are reported in strong shape, however, past due notes showing a decrease in total of 11 per cent, while "notes outstanding" were decreased 25 per cent from November. Compared with December, 1922, one can best appreciate the present condition of the industry by noting that twelve months ago the "notes outstanding" amounted to $1,905,650, whereas this December it only was $874,550.

SALES BY M. A. M. A. MEMBERS DURING DECEMBER REACHED A TOTAL OF $43,289,950

NEW YORK, Jan. 21—Reports from members of the Motor and Accessory Manufacturers Association show that sales in December decreased 17 per cent from November, total sales amounting to $43,289,950 as compared with $51,634,670 in November.

Past due accounts show an increase of 11 per cent and notes outstanding a decrease of 25 per cent.

The following table presents the sales by members of the association, the total past due accounts and notes held for all of 1922 and 1923:

1922	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$17,320,000	20.61 Inc.	$4,450,000	5.45 Inc.	$3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.70 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	2,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	39,753,800	3.90 Inc.	3,463,860	17.93 Dec.	2,603,100	2.09 Dec.
November	36,616 850	5.51 Dec.	4,245,850	22.58 Inc.	2,442,700	6.15 Dec.
December	34,711,630	5.20 Dec.	3,494,850	17.69 Dec.	1,905,650	21.98 Dec.
1923						
January	45,451,950	30.94 Inc.	2,469,950	29.33 Dec.	1,945,850	2.11 Inc.
February	48,518,700	6.75 Inc.	2,741,100	10.82 Inc.	1,981,950	1.86 Inc.
March	59,428,800	22.49 Inc.	2,129,350	22 32 Dec.	1,929,300	2.66 Dec.
April	61,647,050	4.00 Inc.	3,313,150	8.05 Inc.	1,839,350	5.00 Dec.
May	58,409.550	5.25 Dec.	1,982,750	14.28 Dec.	1,140,150	38.00 Dec.
June	58.067,500	.059 Dec.	2,191,150	10.55 Inc.	1,111,970	2.47 Dec.
July	48,536,700	16 40 Dec.	2,313,400	5.60 Inc.	1,424,450	28.10 Inc.
August	50.264,100	3.50 Inc.	2,382,370	7.00 Inc.	1,132 250	20.00 Dec.
September	46,222,650	8.04 Dec.	3,583,000	50.39 Inc.	1,322.550	16.80 Inc.
October	53,803,350	16.50 Inc.	2,857,450	20.00 Dec.	1,094,500	17.00 Dec.
November	51,634,670	4.20 Dec.	2.524,850	13.17 Dec.	1,163,800	5.95 Inc.
December	43,289,950	17.00 Dec.	2,795,300	11.00 Inc.	874,550	25.00 Dec.

Indiana Engineers Hear Paper on Ricardo Engine

INDIANAPOLIS, Jan. 21—Two hundred members and guests of the Indiana section of the Society of Automotive Engineers attended the January meeting to hear Harry L. Horning of the Waukesha Motor Co. read a paper on the Ricardo type engine and other European developments. Following the paper, a discussion took place with Howard C. Marmon, Fred S. Duesenberg, O. C. Berry, F. E. Moskovics and J. H. Hunt participating.

At a brief business meeting there was a discussion of the proposal to increase the dues of the parent society and credit the respective section with a certain sum for each member residing in its zone. The section voted in favor of such a move.

F. F. Chandler of the Ross Gear & Tool Co., chairman of the section, announced the appointment of the following committee to nominate officers for next year: Howard C. Marmon, Fred S. Duesenberg, O. C. Berry, W. G. Wall and George Weidely.

During the afternoon, Mr. Horning demonstrated a Ricardo four-cylinder engine to eighty local engineers in the experimental laboratories of the Wheeler-Schebler Carburetor Co. He was assisted by Mr. Berry.

Fifty Members in Milwaukee

MILWAUKEE, Jan. 19—The newly organized Southeastern Wisconsin section, Society Automotive Engineers, has practically completed the work of procuring a charter membership of fifty to entitle it to tentative membership in the general organization. Officers have been elected as follows: Chairman, George W. Smith, Nash Motors Co., Milwaukee division; vice-chairman, C. W. Pendock, the LeRoi Co., Milwaukee; secretary, Walter S. Lathan, LaFayette Motors Corp., Milwaukee, and treasurer, Louis F. Reinhard, of Geuder, Paeschke & Frey Co., Milwaukee.

BULL DOG TRUCK MEETING

GALENA, ILL., Jan. 21 — Five directors were elected at the annual stockholders meeting of the Bull Dog Motor Truck Co. Officers' reports indicated that the factory was well equipped and predict early production.

Freight Traffic Heads Consider Rail Ratings

DETROIT, Jan. 23—The meeting of freight traffic managers at the headquarters of the National Automobile Chamber of Commerce here was devoted largely to a discussion of technical rate questions, including automobiles, carloads, minimum carload ratings that should apply on shipments of cars and parts and the method to be followed by railroads in fixing the minimum. The meeting favored the loading of freight cars as heavily as possible to conserve equipment.

Data relating to the transportation elements of automobile tops, piston rings, artificial leather binding, visor frames and bodies were discussed and will be submitted to the meeting of the Railroad Classification Committee at New York.

A proposed rule of the carriers, stating just how freight should be loaded in cars and the material that must be used in packing and bracing, was considered in some respects unsuitable for the industry and will also be discussed with the Railroad Classification Committee.

It was decided to make an intensive study of driveaways and the reasons for driving instead of shipping by rail, in view of the present ample car supply, although it developed that most of the driveaways are to nearby points.

The next meeting will be held in Detroit, Feb. 28.

Men of the Industry and What They Are Doing

Miniger and Jones Sail

C. O. Miniger, head of the Electric Auto-Lite Co. and a member of the Willys-Overland board, and George M. Jones, also a member of the board, have sailed on a Mediterranean cruise and will be gone until April.

Evans Visiting South America

Major Harry F. Evans, vice-president and foreign trade manager of the Moline Plow Co., accompanied by Mrs. Evans, has left for a three months' trip to South America. The Moline plow has a large field in South America and Major Evans' visit will be a step toward an increased sales campaign there.

Locomobile Appoints Peterson

J. W. Peterson, formerly factory manager of the Detroit Pressed Steel Co., has been appointed works manager for the Locomobile Co. of America, an appointment made in order to relieve D. G. Roos, vice-president in charge of engineering, of some of his responsibilities, and permit him to act in a consulting capacity in a larger way.

Karl Schreiber Promoted

Karl Schreiber, former assistant superintendent of the Springfield works of the International Harvester Co., has been appointed superintendent in the place of C. H. Smart, who has been transferred to the superintendency of the Deering works of the company in Chicago.

Jerosch Coming Here on Visit

Charles J. Jerosch, general manager of the Continental branch of the Goodyear Rubber Co., sailed from France on the 18th of this month for a two weeks' trip to the United States. Major George H. Robertson also expected to leave Paris on that day for a journey to New York in connection with Voisin and other interests.

Cole Is Hupp Export Representative

Rufus S. Cole, widely known in New York automobile and motion picture circles, has been named export representative of the Hupp Motor Car Corp. Before resuming his work in the export field, he will act as special representative in the United States, handling problems confronting distributors and dealers. The re-entrance of Mr. Cole into the Hupp organization renews a business connection of seven years, starting in 1915. During that and the following year he was in charge of sales in Japan, China, Philippines, Siam, French Indo-China, Straits Settlements, Federated Malay States, Dutch East Indies, India, Burma and Ceylon. In 1916 the Robertson-Cole Co. was formed to specialize in motor car exports, and built up one of the largest businesses of its kind in the world, the value of its 1920 shipments approximating $30,000,000. Mr. Cole has been associated as president with motion picture and realty companies in New York and Los Angeles.

Dine With Erie Cord Tire

Joseph M. Dine has resigned as division manager of the Mason Tire & Rubber Co. to become general salesmanager of the Erie Cord Tire Co. During the last few years Mr. Dine has made his headquarters in Des Moines.

Johnston Manages Cooper Rubber

A. L. Johnston, purchasing agent for the I. J. Cooper Co., has been promoted to the position of general manager, to take effect at once. Mr. Johnston has been spending several weeks in Florida on a vacation, but on his return immediately assumed his new responsibilities. G. M. Gunderson has been made purchasing agent in place of Mr. Johnston. He formerly was stock auditor for the company.

Unwin Joins Distributor

Harry Unwin has retired as sales manager of the National Motors Corp. to identify himself with J. H. Caster, Inc., of Buffalo, handling the Cleveland and National. Mr. Unwin is a veteran who dates his start in the industry back to the pioneer days when he was a New York retailer.

Thornburg Succeeds Tuttle

Carl G. Thornburg, formerly production manager, has succeeded Martin Tuttle as general manager of the Motor List Co. of Des Moines and Detroit. R. L. Polk & Co., directory publishers, recently acquired a controlling interest in the Motor List Co., which was organized in 1906.

Earl W. Northrop Advanced

Earl W. Northrop, formerly sales engineer of the J. W. Murray Manufacturing Co., Detroit plant, has been promoted to assistant manager of the Detroit plant.

Higher Tire Replacement Prices Expected by March

AKRON, Jan. 23—Prospects of price increases on replacement tires during the first month of the year have practically disappeared and the companies which looked for an advance during January now hope that the advance price lists will become a reality by the middle of March.

In some quarters it is still believed that an advance will take place during February.

The rubber industry for the most part continues to operate at a high production point with little if any prospects for profits.

London Show Dates Advanced Fortnight

Set for October and Come Directly After Close of Paris Exhibition

LONDON, Jan. 15 (*by mail*)—Primarily with a view to shortening the "dead" season in car buying, it has been decided by the Society of Motor Manufacturers & Traders to advance the date of the opening of this year's Olympia passenger car show by a fortnight.

The press and agents' private view will, therefore, be on Oct. 16, and the opening to the public on Friday, Oct. 17, instead of the first Friday in November.

An additional reason for the change is that as the Paris show closes on Oct. 15, it is hoped that visitors from more or less distant parts of the world who visit Paris will be more inclined to remain for Olympia.

The change will prevent French, Belgian and Italian firms from exhibiting the same show cars and chassis at both Paris and London as previously; they will have to prepare two sets of "show finished" exhibits, because all those for Olympia must be in position before 10 a.m. on the Press View Day.

It is not considered that advancing the opening date will inconvenience British makers, for the latter are given plenty of notice and can just as well have their 1925 models ready on Oct. 15 as a fortnight later. In fact, it can be said that if the date of the Paris show had not already been announced, Olympia would probably have been put forward to the beginning of October.

Jameson Is Appointed by Hydraulic Steel Co.

CLEVELAND, Jan. 22—James H. Foster has resigned as president of the Hydraulic Steel Co. of this city, and also has severed his connection with the active management of the company in order to devote his time to his other interests. His office for the present will be at the plant of Hydraulic Steel.

Thomas H. Goodbody, receiver, has announced that W. B. Jameson, who has been general superintendent of Earl Motors, Inc., at Jackson, Mich., and who has been identified with the automobile industry for twenty years, has been placed in charge of the manufacturing activities of the company.

Gen. James A. Drain of Washington, D. C., has been made chairman of the preferred stockholders' committee to succeed Fred W. Yates of New York, who resigned because of the pressure of other business.

Tax Repeal Favored by 8 Committee Men

Only One of Them, However, Would Remove All Taxes Asked in Clancy Bills

(*Continued from page* 198)

but made a plea for a square deal for the automobile owner. "All we ask," he told the committee, "is that when the matter of reduction comes up, the automobile owner be given careful consideration, and that the taxes on automobiles be considered as one of the sources for reducing the heavy burden of taxation, and particularly the tax on accessories and repair parts."

If it is impossible to reduce at this time all the taxes on automobiles, then the first step, the speaker said, should be the removal of the 5 per cent on parts and accessories. "This tax is on the going vehicle; it is a tax on misfortune, as it has been called. You need a new tire; you have an accident: your car is damaged; you need a new repair part, when you get it you pay a 5 per cent tax, and this is paid on top of a 5 per cent tax already paid on the purchase of the car. You suffer the misfortune, and then pay the tax, and for this reason it is aptly called a misfortune tax."

Body Builders' Case

The case of the Automobile Body Builders Association was presented by Carey E. Quinn, who, after discussion, summed up his organization's position as follows:

We seek the repeal of the excise tax on parts and accessories for two reasons:

(1) A large part of the tax paid is paid on bodies. The major portion of these are truck bodies, delivery bodies, bus and surburban bodies, for they are practically the only ones sold on the open market as such. The greater portion of the passenger bodies are sold to car manufacturers, or assemblers, and under the administration of the present law, a certificate is received from said car builder that relieves the body manufacturers of the tax.

A truck body is a utility, made of utility material and sold on a utility basis. It would be quite as proper to tax a box car on the railway as to tax these bodies. The body is the utility part of the car. It means the farmer's exit to his market, or to the railway station; it means the final distributive agency for the large portion of all commodities that the railroads bring to central stations.

Calls It Nuisance Tax

(2) In general a very large portion of the tax on parts is a mere nuisance. If the parts are sold to manufacturers of cars, as they generally are, they are relieved of the tax. If they are sold over the counter to the customer, he must pay a tax. Often the customer is paying several taxes on parts of his car. The tax merely means a nuisance to most of the industry to avoid same. Regardless of the revenue collected, the tax on parts was never right and should be repealed.

F. C. Van Cleve, secretary of the B. F. Goodrich Co. and chairman of the tax committee of the Rubber Association of America, made a plea for the removal of the 5 per cent tax on tires, tubes, parts and accessories, declaring that a tax on them was a misfortune which the motorist should not pay.

Application of the tax, he explained, is detrimental to export business for the tire jobber, although it does not affect the manufacturer if he sells direct to a foreign purchaser. Export tires, he explained, are largely sold to jobbers, who export them. Under such circumstances the 5 per cent tax is collected. Figures were presented showing that about 10 per cent of the present output of tires and tubes are exported.

W. Howard Hamilton, representing the National Association of Taxicab Owners, some 130 in all, operating 15,000 cabs, recited the following list of taxes which taxicabs are subject to in various States:

(1) property tax; (2) Federal capital stock; (3) State capital stock; (4) Gasoline tax; (5) State franchise tax; (6) Federal income tax; (7) State income tax; (8) automobile license tax covering tags; (9) chauffeurs' license tax; (10) gasoline storage tax; (11) minor privilege tax in some states, such as where a phone is put in an apartment house for taxi service, such as the $10 tax in Maryland; (12) garage tax; (13) solicitor's license tax, and even in some Western states, wheel-taxes, taxing the taxicab a flat sum of so much per car per year.

The case of the automobile industry's fight to repeal the taxes was closed by Congressman R. H. Clancy, author of the bills, who summed up for the committee the testimony given by the various interested parties. He cited facts and data taken from AUTOMOTIVE INDUSTRIES, "as the trade's leading publication," and read into the record statistics on the automobile industry from the N. A. C. C.'s "Facts and Figures."

Couzens States Industry Prefers Surtax Removal

WASHINGTON, Jan. 24—While members of the House Ways and Means Committee were hearing testimony from representatives of the automotive industry on Monday of this week, Senator James Couzens of Michigan, former partner of Henry Ford, took occasion to declare from the floor of the Senate that, despite the representation of the National Automobile Chamber of Commerce before Congress on the excise tax repeal, the automobile manufacturers themselves were not interested.

He said:

I asked some of the motor car manufacturers of Detroit in November whether they preferred to have the surtax reduced or whether they preferred to have the automobile tax remitted. They said they preferred to have the surtax reduced. Why? Because the 5 per cent excise tax on the automobile can be passed on to the consumer and is being and has been passed on to the consumer and will continue to be passed on, while the surtax cannot be passed on to the public. That is the reason why the big motor industry is not kicking up a big fuss about the 5 per cent tax on automobiles, but prefers that the reduction in tax, if possible, be passed to the big surtax income-tax payers.

$640 to $655 Price Cuts Made by Paige

Affect Standard Line and Result from Dropping Equipment Used in 1923

DETROIT, Jan. 21—Substantial reductions in the Paige prices have been made through the elimination of additional equipment which marked the 1923 product.

This has brought about cuts of from $640 to $655 in the Standard line, while a new offering is made in the shape of De Luxe models which includes such additional equipment as a fifth cord tire, tube and cover; bumpers front and rear; luggage rack and body guard rails at rear; nickel radiator and headlamps; Moto-Meter, automatic windshield wiper; rear view mirror, combination stop and tail light, and sun visor.

The De Luxe models list at $1,995 in open jobs and at $2,770 for closed cars.

The new price list is as follows:

STANDARD MODELS

		Old Price	New Price
4-pass.	phaeton	$2,450	$1,795
7-pass.	phaeton	2,450	1,795
5-pass.	sedan	3,235	2,595
7-pass.	sedan	3,235	2,595

DE LUXE MODELS

4-pass.	phaeton	$1,995
7-pass.	phaeton	1,995
5-pass.	sedan	2,770
7-pass.	sedan	2,770

Disk wheels are $35 extra on all models.

Wills Ste. Claire Report Covers 5-Month Period

DETROIT, Jan. 24—An operating loss of $302,454 for the period from the time of the reorganization July 3, 1923, to Nov. 30, 1923, is shown in the report of Wills Sainte Claire, Inc. The profit and loss deficit on Nov. 30 last was $115,-160. Cash and United States notes aggregated more than $2,000,000, while quick assets totaled $3,570,382 against current liabilities of $497,627.

The balance sheet shows, among the assets, $219,293 in accounts receivable, $83,424 in notes receivable, $86,799 in branch investments and $1,143,138 in inventories. Fixed assets are placed at $4,870,401, good will at $1,500,000 and deferred charges $66,398.

Liabilities include $373,552 in accounts payable, $80,549 in accrued wages, taxes, ets., $43,526 in reserves for claims, $1,-656,000 in 7 per cent prior preferred stock, $4,000,000 in 6 per cent preferred stock, $4,000,000 in 6 per cent second preferred stock, $2,012,714 in common stock and $115,160 in profit and loss deficit.

2070, AMERICAN BOSCH FORCE

SPRINGFIELD, MASS., Jan. 22—The American Bosch Magneto Corp. has brought its employment force here to 2070, the largest number since 1919, when the plant was manned by 2600.

Gunn Reelected Head of Lincoln Highway

Prominent Figures in Industry Attend Dinner Incident to Annual Meeting

DETROIT, Jan. 21—The tenth annual meeting of the board of directors of the Lincoln Highway Association, held here last Thursday, was marked by the re-election of all the officers and the holding of Founders' Dinner at the Detroit Athletic Club. The dinner, given by President J. Newton Gunn, was attended by such prominent figures in the industry as Roy D. Chapin, Alvan Macauley, G. M. Stadelman, E. V. Rickenbacker, E. W. Bassick and Colonel Henry B. Joy.

The election returns to office the following: J. Newton Gunn, president; F. A. Seiberling, vice-president; Henry B. Joy, vice-president; Carl G. Fisher, vice-president; Roy D. Chapin, vice-president; Austin F. Bement, vice-president and secretary; Gael S. Hoag, field secretary; Emory W. Clark, treasurer; directors, Alvan Macauley, W. O. Rutherford, John N. Willys, Edsel B. Ford, C. S. Mott, W. C. Durant, A. Y. Gowen, Col. Sidney D. Waldon and G. M. Stadelman.

Discuss Situation in West

The board discussed the western highway situation, which includes the well-known Utah angle, and decided in view of present conditions to hold up temporarily western appropriations, although there is a substantial sum in the treasury for that purpose. The board feels that until Federal aid can be invoked in this work that it had better pursue a policy of watchful waiting.

Income for the year was $50,944, and expenditures were $42,379.

After ten years of continuous effort the association reports that it has raised and expended over $900,000. Contributors to this fund include several of the big concerns in the industry, which are backing their belief in good roads as an aid to their business through substantial contributions. Among the contributions is $130,000 from the United States Rubber Co. for the construction of the Ideal Section near Dyer, Ind. The Willys-Overland Co. paid $20,000 for improving the highway in Wyoming and another $15,000 for marking the route from Omaha to New York City, while $52,000 of the check of the General Motors Corp. went into work in Nevada.

Work Far from Complete

Outlining the association's future efforts, Mr. Gunn said:

"When will the Lincoln Highway be completed?" No question is more frequently asked. The answer is "never." The development of the route will be perennial and unending.

Much remains to be accomplished. The picture is too big to be presented here. But the story can be briefed: The route is far from completion. Our western difficulties are not yet solved. The Lincoln Highway is not yet in line for improvement in western Utah where we have involved $100,000 from the Goodyear Tire & Rubber Co., and $25,000 from Carl G. Fisher. That difficult problem will be worked out. Our remaining contracts with Nevada, involving $50,000 out of the General Motors Corp. trust fund, have not yet been carried through to completion.

We have additional aid to administer from the Willys-Overland trust fund. There is no satisfactory connection between Pittsburgh and the Ohio line. Tnere is no satisfactory road across Ohio. Pavement lags in Iowa where the road for 380 miles should be continuous concrete from the Mississippi to the Missouri. The road as a whole is inadequate in width and type between New York City and Chicago.

Marking requires maintenance and renewal. Many major shortcomings remain to be corrected. Our Ideal Section has not yet been completed and dedicated and the educational purpose for which it was built has not yet more than begun to be realized.

Automotive Plants Show Employment on Increase

MILWAUKEE, Jan. 21—Reports of the employment situation in Milwaukee at the beginning of the year showed that the automotive parts and equipment industries gained 2.2 per cent in number employed from Dec. 1 to Jan. 1, while the general average was a decline of 2 per cent.

Forty-eight concerns employing 500 or more, which are used as the index, were as a whole employing 1.8 per cent fewer people on Jan. 1 than on the same day in 1923.

It is stated that forward orders in the automotive industry were uniformly above those of a year ago.

Employment High in Toledo

TOLEDO, Jan. 19—Toledo's employment in automotive plants is almost up to the 1923 peak at the present time.

Last week there was a net gain of 1968 employees in the fifty-one plants which report to the Merchants and Manufacturers Association, or a total of 25,672 workers.

This is compared with approximately 15,000 at work a year ago.

The Willys-Overland and its many subsidiary automotive plants here are all going at full speed.

Tariff Rates on Tires Increased in Rumania

WASHINGTON, Jan. 21—An appreciable increase in the import duty on automobile tires, both solid and pneumatic, imported into Rumania has been reported by the Commercial Attache at Bucharest to the United States Tariff Bureau of the Department of Commerce.

The rates on solid tires, pneumatic tires and inner tubes, mounted on rims, have been increased from 600 to 6000 Lei per 100 kilos net, while the rate on solid tires, inner tubes and pneumatic tires, not mounted on rims, has been increased from 300 Lei to 4000 Lei per 100 kilos net. The normal rate of the Lei is $0.19, but at the present time is approximately $0.005 (one-half cent).

Ford Plans to Build New Plant in Dallas

Acquires Thirty Acres of Land—Company Will Erect Homes for Employees

DALLAS, TEX., Jan. 22—The Ford Motor Co. is to erect a large assembling plant here, the fact becoming known when the city of Dallas granted privileges for closing several streets where the big enterprise is to be located. At the same time announcement was made that the company, with the Texas and Pacific railroad, had acquired thirty acres of land for the site of the plant.

The plant will be 850 feet long and about 500 feet wide, will be constructed of concrete and steel, will cover between seven and eight city blocks and will be fire proof.

It is understood that 1200 persons will be employed at the new plant and that the present plant employing 300 men will be abandoned. The plant probably will supply the demands of Texas, portions of the West and South, Mexico, Cuba and Central America.

Homes for employees will be erected on the company's holdings about the industrial site.

Demands of Industry for Lumber Increase

ATLANTA, GA., Jan. 23—First quarter delivery of white ash, maple and elm to the automobile and body manufacturing trades will be materially greater this year than in 1923, according to lumber wholesalers and manufacturers in the Atlanta lumber market. It is stated that the demand for thicker dimensions from the body trades is somewhat larger so far this year than the southern mills can immediately supply.

In 1923 this trade was the largest by far in the history of the lumber industry in the South, but lumbermen are expecting an even better year in 1924, if present plans of the automobile manufacturers to increase production are carried out.

Prices remain substantially unchanged over those prevailing two months ago, but are about 5 to 10 per cent higher than last fall. The present increase in demand is expected to send prices further upward.

GILL BATTERY ELECTION

SAN BERNARDINO, CAL., Jan. 21—The annual meeting of the Gill Storage Battery Co. resulted in the re-election of all its directors. W. L. Gill was elected president and general manager; M. R. Standish, vice-president in charge of sales and advertising; W. N. Vaughan, secretary and office manager, and Edward Reber, treasurer. The company, after three years' operation, is about to move into an enlarged factory.

Healthy Sales Growth Shown in California

Truck Business Makes Biggest Percentage of Increase During December

OAKLAND, CAL., Jan. 22—While California dealers in passenger cars and commercial vehicles did not reach the percentage increase in sales for December, 1923, over December, 1922, that was shown by the latter month over December, 1921, when the record gain of 99 per cent was made, nevertheless, the merchandising department of the industry in California showed a healthy growth for the month just closed.

For December, 1923, the dealers throughout California sold 17,363 automotive vehicles, compared with 16,963 sales for December, 1922, an increase of 400 sales, or about 2½ per cent.

Truck dealers had their innings in December, 1923, when they sold 1756 vehicles as compared with 1554 in the same month in 1922, an increase of 12 per cent. Southern California truck dealers went beyond this, when they sold 1178 new trucks for December, 1923, as compared with 755 in December, 1922, an increase of 423 vehicles, or more than 50 per cent.

Up to the middle of January, 1924, there is every indication that this month will show a comfortable increase over December, 1923, and over January, 1923, as well, in sales of both passenger cars and trucks. The cooperative fruit and vegetable marketing associations have disposed of the larger part of their holdover, as well as of the winter's production; the fruit and vegetable canneries have sold nearly everything they put up, and the grain and cattle and sheep men have had an excellent year.

Money is more plentiful in California than it has been in any January since the World War, and the improvement and extension of the paved highways is causing a greater demand than ever for both passenger and freight carrying motor vehicles.

PROGRAM OF EVENTS TO TAKE PLACE IN CHICAGO INCIDENT TO HOLDING OF SHOW

CHICAGO, Jan. 24—Following are some of the important events scheduled for the week of the Chicago National Automobile Show:

Friday, Jan. 25

Cadillac Chicago branch dinner at Blackstone Hotel, evening.

Saturday, Jan. 26

National Automobile Show opens at Coliseum and Armory, to continue until Feb. 2.
Salon opens at Drake Hotel.
12:00 noon—Auburn Motor Co. factory luncheon, Blackstone.

Monday, Jan. 28

10:00 a. m.—Directors' meeting, National Automobile Dealers Association, LaSalle Hotel.
Remy Electric Co. dinner at Congress Hotel, evening.

Tuesday, Jan. 29

10:00 a. m.—National Automobile Dealers Association, seventh annual convention opens at LaSalle.
12:00 noon—Auburn luncheon, Blackstone.
1:00 p. m.—Midwest Rubber Manufacturing Association luncheon, Morrison.
6:30 p. m.—Old Timers' Club banquet, Congress.
6:30 p. m.—N. A. D. A. annual banquet, LaSalle.
6:30 p. m.—Midwest Rubber Manufacturing Association annual banquet, Morrison Hotel.
6:30 p. m.—Oakland dinner, Blackstone.

Wednesday, Jan. 30

10:00 a. m.—N. A. D. A. convention, LaSalle.
Automotive Electric Service Association, annual meeting, Congress.
12:00 noon—Auburn luncheon, Blackstone.
6:00 p. m.—Oldsmobile dealers' dinner, LaSalle.
6:30 p. m.—Hupp Motor Car Co., banquet, Congress.
6:30 p. m.—Willys-Overland dealers' banquet, Congress.
7:00 p. m.—Paige-Detroit, dealers' dinner, Blackstone.

Thursday, Jan. 31

10:00 a. m.—N. A. D. A. directors' meeting, LaSalle.
12:00 noon—Stutz Motor Car Corp. luncheon, Congress.
12:00 noon—Illinois Automobile Club luncheon, Congress.
Buick luncheon, Blackstone.
6:30 p. m.—Durant distributors' dinner, Congress.
7:00 p. m.—Studebaker dealers' dinner, Blackstone.

Show Proves Stimulus to Sales in New York

NEW YORK, Jan 22—The week after the automobile show found business quite brisk along the Row. Salesrooms felt the after effects of the show and in most of the establishments a good record of sales was made. Some dealers had an influx of salesroom visitors, with an encouraging quota of sales. On Monday following the show and throughout the week, salesmen followed up prospects obtained at the armory with decidedly good results.

Distributors and branch managers generally confirmed the impression that sales on the exposition floor had not been up to the standard of the last year or two. It looks, however, as though January business in the aggregate would make the show about as effective as it has been in most recent years.

Throughout the trade there is quite general satisfaction with the Bronx armory site.

Cadillac Reports 1923 as Making New Records

DETROIT, Jan. 23—Cadillac Motor Car Co. reports sales, shipments and deliveries of cars in 1923 as marking the highest point in its history. With the reception that has been accorded the new Cadillac models in the first four months of their introduction, and with the generally prosperous condition in all sections of the country, business in 1924 is expected to set still higher marks.

Growth in sales has been accompanied by a strengthening of the dealer organization, improvements in service facilities and the erection of many new buildings by distributors and dealers, the company reports. Closer factory cooperation is also being maintained through an increase in district supervision.

Demand Gains Slightly on Supply of Gasoline

WASHINGTON, Jan. 23—The demand for gasoline is gaining slightly on the supply. Figures compiled by the United States Bureau of Mines show that on Dec. 1 there was an increase of 15 per cent in the total demand, as compared with a year ago, and an increase of only 11 per cent in the supply. The refineries on Dec. 1, however, had 27 per cent more gasoline than on the same date a year previous.

Gasoline stocks amounted to 985 million gallons the first of December, representing an increase of 38 million, or 4.03 per cent over stocks of Nov. 1. The domestic gasoline consumption in November was 536,308,809 gallons, a decrease from the October consumption of 12.85 per cent

DETROIT EQUIPMENT ELECTS

DETROIT, Jan. 21 — The Detroit Equipment Co., maker of the Detroit Auto cigar lighter, has elected David H. Ladd president, Willis P. Thomas, vice-president; Melvin F. Doty, treasurer, and Rowland M. Connor, secretary.

Northwest Situation Not Alarming Trade

Closing of Banks Expected in View of Conditions for Last Two Years

MINNEAPOLIS, Jan. 22—The present banking situation in the Northwest which has brought about the liquidation of many banks and the restriction of credit is not alarming local automobile interests, for this situation was expected in view of the conditions existing for the last two years.

With a ratio of three banks to where only one is needed, it is not considered strange that liquidation of some of these institutions is going on. Yet with restriction of credit resulting from the conditions which have caused the closing of banks, leading automobile distributors are hopeful of good business in the spring for all established lines of cars whose agents have good standing with banks as well as good service facilities.

The question is how long present abnormal conditions will continue, and how much money there is hidden away that will be used for the purchase of cars. The hysteria that usually causes bank runs is not evident in the Northwest. Banks, fed up on poor land paper, are closing that should have quit two years ago. Some are shutting their doors because of depleted reserves, and others are liquidating as a business measure. In either case the sound banks remaining will have more business.

Loans to Banks Decline

Acceptance corporations and large city banks are among the agencies that will help the country dealers, and it is to be decided soon how far the finance corporations may go in assisting trembling banks. The Federal Reserve has on loans to members only $14,000,000, as against a peak record of $132,000,000. The Federal Reserve Bank is prepared to loan at any time on paper that it can accept.

Whatever credit restrictions there are in this territory as to automobile sales is only automatic and part of the general situation, but not specific as to motor cars. Dealers in cities and towns where banks have closed, who have good standing, have been able in many cases to arrange accommodations with the remaining banks.

While it is considered that the present credit situation will affect automobiles to some extent, distributors are inclined to believe that this will be only temporary and that with the spring opening the outlook will improve.

NEW YORK TRAFFIC PLAN

NEW YORK, Jan. 22—A main thoroughfare running north from downtown New York and leading into Westchester County would greatly relieve traffic congestion in this city, believes Gen. John F. O'Ryan of the Transit Commission. Accordingly, he has suggested that the present tracks of the New York Central on the west side be roofed over, making a motor road that would take many vehicles off the city streets. He would have the New York Central electrified and the motorway elevated, which would permit of increased speed and freedom from street intersection stops.

FINANCIAL NOTES

Reynolds Spring Co. reports for 1923 net earnings of $391,254, against $334,553 in 1922. After reserves for depreciation and Federal taxes the net income was $290,234, equal to $1.57 a share on the 177,010 common shares of no par value. In 1922 the company reported earnings of $2.74 a share on the 73,300 shares of common stock then outstanding.

American La France Fire Engine Co. for the eleven months ended Nov. 30, 1923, reports net profits of $696,521 after all charges and taxes. After providing for preferred dividends, the balance available for the common stock is equal to $1.90 a share on the 290,400 shares of $10 par value common stock outstanding.

Maxwell Motor Corp., having decided to refund its $4,456,856 notes, due June 1 next, will offer shareholders $5,000,000 7 per cent sinking fund ten year gold debenture bonds, convertible into Class A stock at $75 a share, to be underwritten by the Chase Securities Corp. and Blair & Co.

Kruecke Bros. Manufacturing Co., Milwaukee, manufacturer of brass castings and finished products, has filed a voluntary petition in bankruptcy. The schedules give liabilities of $57,617 and assets of $42,411. Unsecured claims amount to $30,342.

Fifth Avenue Bus Line Acquisition Is Pending

NEW YORK, Jan. 22—Everything points to an announcement soon of the acquisition of the Fifth Avenue bus line by Chicago Motor Coach and Yellow Cab interests as represented by John Hertz. Conferences have been held here recently to talk over such a merger, but the public announcement has been withheld until the Transit Commission of the State shall have passed upon the plans.

Mr. Hertz is said to have worked out an intercity transportation plan, that will be most radical in its character, but which he will not attempt to put through unless he is certain it will meet with the approval of the Transit Commission, under whose jurisdiction it will come.

The Transit Commission, through General John F. O'Ryan, one of its members, states that it has had these plans submitted to it and that a decision will be handed down shortly.

35,000 STUDEBAKERS PLANNED

SOUTH BEND, IND., Jan. 23—Production for the first quarter for the Studebaker Corp. has been set at 35,000, according to a statement issued by President A. R. Erskine, who states that unfilled orders on hand call for deliveries over the first three months much larger than for the same period last year.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Business continued generally active last week. Stock quotations advanced, while commodity prices tended slightly downward. Iron and steel mills reported increased activity, while steel prices turned definitely upward after having remained essentially stable for six months.

Cotton consumption in December amounted to 461,560 bales, comparing with 531,631 bales in November and 529,342 in December, 1922. The exports, 845,581 bales, were larger than in any month since January, 1920, with the exception of November, 1922.

The year's total of exports, amounting to $4,165,000,000, compares with $3,832,000,000 in 1922, and the imports of $3,789,000,000 compare with $3,112,000,000 for 1922. The export balance, however, is only $376,000,000 as against $719,000,000, and is the smallest since 1914.

Fisher's index of wholesale commodity prices last week stood at 150.7, as compared with 150.9 for the previous two weeks and 151 three weeks before. The wholesale price index of the Bureau of Labor Statistics is 151 for December, against 152 for November and 156 for December, 1922.

Discounts by Federal Reserve banks declined $72,700,000 during the week ended Jan. 16, while purchased bills decreased $26,400,000 and Federal Reserve notes in circulation $62,700,000. Holdings of Government securities increased $16,300,000, total deposits $14,900,000, and reserves $31,900,000. The reserve ratio rose from 78.4 to 80.1 per cent.

Loans of reporting member banks declined $136,000,000 during the week ended Jan. 9, most of the decline being in loans secured by stocks and bonds.

Yellow Cab Shows Gain in Earnings Last Year

CHICAGO, Jan. 24—The Yellow Cab Manufacturing Co. had net earnings of $4,000,000 for 1923 as compared with $3,038,926 in the previous year, according to the report just made. The company paid dividends of $1,685,437, leaving a balance for surplus of $2,315,000 as against $2,064,176 in 1922. This brings the total earned and capital surplus to more than $8,000,000.

The Yellow Cab Co., operating the taxicab service, showed profits available for dividends of $2,000,000, equal in excess of $5 a share on the 400,000 shares of stock outstanding, the preliminary estimate shows. This compares with $1,773,072, or $8.86 a share on the 200,000 no par value shares in 1922. The company's net surplus for 1923 was $1,250,000 against $973,026 in 1922, leaving a gross surplus of more than $2,250,000. The company now is operating 2602 cabs, against 1590 at the start of 1923.

Road Makers All Set for Year's Activities

Convention Hears That Many Highways Have Reached Saturation Point

CHICAGO, Jan. 21—Members of the American Road Builders Association, which held its twenty-first annual convention and fifteenth national good roads show here, are all set for an extensive construction program in 1924. Many roads, it was declared, have now practically reached the traffic saturation point.

Thomas H. MacDonald, chief of the Federal Bureau of Public Roads, emphasized the importance of the automobile in the broad general plan of transportation and warned against the accumulated costs of using rolling stock without properly constructed highways. The United States Government and the respective States, he said, have defined a major objective in road construction and are not working in a haphazard manner, and individual States have for years been working on systematic programs. These clearly defined plans, he said, make it easier to go to Congress and the various State Legislatures with requests for funds.

Closer Cooperation Urged

President Frank Page, chairman of the North Carolina State Highway Commission, urged closer cooperation between engineers, contractors, State officials and makers of labor-saving machinery, and dissemination and exchange of information which would result in a more effective use of road-making machinery.

Accumulation of comprehensive traffic data as a means of providing for a permanent type of highway surface was urged by H. E. Hamlin, superintendent of repairs, Connecticut State Highway Commission, the design to be based upon a definite idea of the amount, weight and concentration of vehicular traffic, in which must be considered an allowance for increase for the estimated life of the surface type. He pointed out that, if a comprehensive survey is undertaken for a continued period of time, and the increase of motor vehicle registration in the State is used as a factor, it follows that from subsequent surveys taken over short critical periods of time, curves can be plotted which will to a fair degree of accuracy determine potential traffic for a limited period of years.

State Has Highway Stations

The plan in Connecticut provides for a system of highway stations. In the case of motor trucks the data gathered consist of length of haul, type of commodity, and seasonal variation is considered in filling out the forms. Pit scales are used to determine overweight. If the vehicel is a passenger car, the number of passengers, average distance of trip, and the question of whether the car is used for business or pleasure are determined.

Edward E. Reed, assistant State highway engineer of the New Jersey Highway Commission, told the convention that the roads are cleared of snow by letting the work to contractors rather than using State forces. Fleets of trucks are kept in readiness, and advance information is obtained from the weather bureau and from field forces as to approaching storms. Removal of snow is begun as soon as two inches have fallen.

N. H. Isabella, assistant maintenance engineer of the Wisconsin Highway Commission, said that figures in his State indicated that 60 per cent of highway traffic accidents are directly due to reckless driving, that of the remaining percentage but a small proportion is chargeable to the road builder and engineer. He urged uniform traffic regulations and enforcement, uniform system of warning cautionary signs, systematic maintenance of highways and safety education in schools.

INDUSTRIAL NOTES

E. V. Rippingille and V. G. Souder, who for the last two years have represented the John Warren Watson Co. as Watson Stabilator distributors in Detroit, have sold this business to the Watson company which will operate it as a factory branch. Rippingille and Souder will open a manufacturers' representative office in the General Motors building, continuing to handle in this connection the Whitmore line of lubricants and Grolan gages.

North East Service, Inc., Paris, France, has moved into new quarters at 17 Rue Villaret de Joyeuse, remaining under the direction of R. J. Kelleher, who has been in charge since its establishment in 1919. The company represents the North East Electric Co. of Rochester, N. Y.

Norma Co. of America expects to be in its new plant at Stamford, Conn., in a few months. It still is operating its Long Island City plant and will continue there until the Stamford establishment is ready.

Kalamazoo Sheet Metal Will Expand Operations

KALAMAZOO, MICH., Jan. 23—Last year was the best in the history of the Kalamazoo Automotive Sheet Metal Works, according to reports offered at the annual meeting of the company.

The year's output represented a 50 per cent increase over 1922.

Enough orders are booked now, it was stated, to run the plant for months, necessitating an expansion of manufacturing facilities through additional equipment and employees.

C. B. McDole was reelected president and general manager; D. H. Stewart, vice-president, and W. E. Skinner, secretary-treasurer. These officers, with C. S. Campbell. E. V. Brigham, J. S. Rockwell and Dr. Keene B. Phillips constitute the board of directors.

Cuba Holds Promise to Buy More in 1924

High Prices of Sugar Will Mean Increased Sales of Cars, Declares Ford

DETROIT, Jan. 21—Ford Motor Co. is looking to the Cuban market to take many more cars in 1924 than in the year just closed, in which period its sales were 3241 cars, 654 trucks, 348 Fordson tractors and fourteen Lincoln cars. In total units the sale surpassed the best previous year by 790. The increasing distribution of transportation units is in itself both an effect and cause in the growing wealth of the island, the company reports.

Sugar prices now are at a relatively high level, and as sugar is the dominating product of the country, the indications are, says the company, that the market for cars will be steadily larger during the year. There are more than 1,375,000 acres planted with cane, which produce annually 4,000,000 tons of a value approximating $200,000,000 to $300,000,000. Success in the use of power units, says the company, is making possible increased production and reducing labor costs, directly affecting the economic situation of the country.

Forty-three Ford dealers on the island, under the leadership of the Havana branch, have been carrying on a campaign of education as to what tractors and trucks will do. By establishing their reliability they are gradually supplanting the ox-teams, and the company reports agricultural students are now looking forward to the use of special harvesting machines to take the place of man power within the next few years in cutting and loading crops.

The saturation point of automobile sales will never be reached even at the present high rate of increase, says the company, quoting an American bankers' commission report. The automobile itself is creating the means for obtaining more.

Dates Fixed by Geneva for International Show

GENEVA, Jan. 11 (*by mail*)—The first International Motor Exhibition ever held in Geneva is to take place from March 14 to 23 under the patronage of la Chambre Syndicale Suisse de l'industrie automobile and other bodies.

Exhibitors will be composed of manufacturers established in Switzerland showing their own products, agents of foreign vehicles established in the country, and foreign makers of automobiles, motor trucks, buses, trailers, tractors, airplane engines, motorboats, motorcycles, accessories and parts, tires and equipment and machinery used in the manufacture of motor vehicles.

Foreign body builders will not be given the opportunity of exhibiting.

Calendar

SHOWS

Jan. 26-Feb. 2—Chicago, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.

Feb. 4-9—Chicago, Tenth Annual National Motorcycle, Bicycle and Accessory Show, Broadway Armory, under the auspices of the Motorcycle and Allied Trades Association, A. B. Coffman, secretary.

FOREIGN SHOWS

April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederacion de Camaras Sindicales Espanolas del Automovilismo y Ciellismo, Palacio de Arte Moderno.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

RACES

Aug. 3—Lyons, France, European Grand Prix.

April 27—Trapani, Italy, International Automobile Race.

CONVENTIONS

Jan. 30-31—Chicago, Fourth Annual Meeting of the Automotive Electric Service Association, Congress Hotel.

Jan. 31-Feb. 1—Rochester, N.Y., Winter Sectional meeting of the American Society for Steel Treating, Hotel Seneca. W. H. Eisenman, secretary, 4600 Prospect Avenue, Cleveland.

May 21-24—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.

June 3-4—Detroit, Midsummer Meeting of the Automobile Body Builders Association, Hotel Statler.

June—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

S. A. E. MEETINGS

Feb. 4—Buffalo Section, Engines for Oil vs. Oil for Engines, L. H. Pomeroy, A. Ludlow Clayden, Statler Hotel, Buffalo, 8 p.m.

Feb. 14—Indiana Section, Motor Tests and Research Work, C. P. Grimes, Hotel Severin, Indianapolis, 8 p.m. Dinner 6.30 p.m.

Feb. 14—Metropolitan Section, Vehicle Depreciation.

March 13—Metropolitan Section, Replacement Parts and Accessories.

April 17—Metropolitan Section, Fleet Maintenance, F. W. Winchester.

May 15—Metropolitan Section, What Roads and Steels Do to Automobiles.

Lists for Grand Prix Include 18 Entrants

PARIS, Jan. 15 (*by mail*)—Entries for the European Grand Prix 500-mile road race for 122 cu. in. cars have closed with eighteen cars enrolled, the firms represented being Fiat (four); Sunbeam (three), Bugatti (four), Delage (three), and Alfa-Roméo (four). Italy has eight cars in the race, England three and France seven.

Entries at double fees are received until the end of February, but it is not expected that many new names will be added to the list.

On the day preceding the 122 cu. in. race there will be a phaeton endurance test and race, for which three classes are provided. In the two-seater class the firms are Ariès, Mathis, Sénéchal and Voisin.

In the four-seater light car class the entrants are Ariès, Ansaldo, Cottin-Desgouttes, Bignan, La Buire and Georges Irat. In the big car class Peugeot, Vermorel, Ariès, Voisin, Alfa-Roméo and Steyr are the entrants.

The total number of starters in the three classes is thirty-eight. The phaetons have to run eight hours at a fixed average on a limited amount of gasoline and afterwards to race 300 miles also on a limited amount of gas.

Committees Appointed by Rubber Association

NEW YORK, Jan. 21—W. W. Duncan, manager of distribution of the Hood Rubber Co., has been elected chairman of the Tire Manufacturers Division of the Rubber Association of America. G. A. Waddle, manager of dealer relations of the Goodyear Tire & Rubber Co., is vice-president. W. H. Sorn of the Goodyear Tire & Rubber Co., has been elected chairman of the service managers committee.

The executive committee, in addition to Messrs. Duncan and Waddle, includes J. C. Weston of the Ajax Rubber Co.; E. B. Germain, Dunlop Tire & Rubber Corp.; M. J. O'Donnell, Falls Rubber Co.; E. H. Broadwell, Fisk Rubber Co.; S. S. Poor, General Tire & Rubber Co.; H. C. Miller, B. F. Goodrich Co.; J. H. Kelly, Hewitt Rubber Co.; W. H. Bell, Kelly-Springfield Tire Co.; John Kearns, Lee Rubber & Tire Corp.; F. C. Millhoff, Miller Rubber Co.; S. G. Lewis, Pennsylvania Rubber Co.; W. S. Wolfe, Seiberling Rubber Co.; T. F. Walsh, Swinehart Tire & Rubber Co., and G. S. Shugart, United States Tire Co.

Officers and members of the executive committee of the Foreign Trade Division of the association also have been selected as follows: Chairman, K. S. Chamberlain, Fisk Tire Export Co.; vice-chairman, C. E. Wagner, Miller Rubber Co.; members of executive committee: A. G. Cameron, Goodyear Tire & Rubber Export Co., ex-officio; A. R. Gormully, Ajax Rubber Co., Inc.; H. G. Lubke, General Tire & Rubber Co.; E. H. Huxley, United States Rubber Export Co.; H. A. Reed, Kelly-Springfield Tire Co., and F. E. Titus, International B. F. Goodrich Corp.

De Palma Is Eliminated from Contests of A. A. A.

LOS ANGELES, Jan. 21—Ralph De Palma, twice winner of the Indianapolis race and long regarded as one of America's leading drivers, cut himself out of competition in all meets sanctioned by the American Automobile Association when he drove at the opening meet at Ascot Park here yesterday.

Ascot is running under sanction of the International Motor Contest Association, consequently De Palma's action automatically bars him from competition at Indianapolis and other speedways owing allegiance to the A. A. A.

De Palma's jump did not bring him much. He finished sixth in the feature twenty-five mile event, which was stopped in the eighteenth lap because of dust, Fred Liokleider of Dayton being declared the winner. Ascot Park is a five-eighth mile dirt circuit.

Renault Closed Down by Floods in Paris

PARIS, Jan. 12 (*by mail*)—Water having reached his power plant at the height of the Seine floods, Renault has been obliged to shut down his entire works, thus throwing 20,000 men out of employment.

Since 1910 precautions had been taken to keep water out in case of river floods, and these were successful until the last day of the rise, when the river reached such a height that the boilers were flooded. If the present fall continues, it is expected that the factory will be started again in one week.

Other Paris factories suffering from the Seine floods are Talbot-Darracq, with one of the machine shops partly under water, the case hardening plant submerged, and the heating system out of operation; Unic, De Dion, Bouton, Latil and the two Citroen factories at Levallois and at Paris partially flooded; the Hotchkiss test shop under water and Delaunay-Belleville with 200 men out by reason of flooded shops.

The Goodrich tire factory at Colombes has suffered considerably by reason of the overflowing river.

Wisconsin Truck Makes Buses with Six Wheels

MADISON, WIS., Jan. 21—The Wisconsin Truck Co., which was established a year ago to manufacture a new design of motor truck chassis having dual rear wheels, embodying the quadruple drive principle, or six wheels in all, is engaging actively in the production of a six-wheeled passenger bus in 24- and 28-passenger capacity sizes.

Eight buses have been contracted for. The concern recently completed a 24-passenger bus on a four-wheeled chassis for the Madison-Mendota Transportation Co., but it intends to build six-wheeled buses exclusively. This design permits of four-wheel brake installation without front-wheel brakes.